GEORGE W. FULLER

PROCEEDINGS

OF THE

Twenty-Ninth Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, December 4th and 5th

1903

IN THE

Laurel House, Lakewood, N. J.

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1904

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Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers and other citizens of our State, interested in Sanitation as related to our homes, our schools and our municipalities. Any citizen may become a member of the State Association on application to the Secretary or any member of the Executive Council, on the day of meeting. The membership fee is two dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of the methods relating to the prevention of sickness and the promotion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise and preventing harmful sanitary legislation, and also to aid the State and Local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health, a part of the annual meeting is devoted to such special subjects as relate to the work of Local Boards of Health. Every Local Board should have present at the annual meetings its assessor, physician, inspector, or some other active member. The information secured for the benefit of each locality more than compensates for the expense.

MINUTES

OF THE

Twenty-Ninth Annual Meeting of the New Jersey Sanitary Association,

December 4th and 5th, 1903.

OFFICERS, 1902—1903.

President, ... JOHN L. LEAL, M.D., Paterson.
First Vice-President, ... M. N. BAKER, C.E., Upper Montclair.
Second Vice-President, ... NORTON L. WILSON, M.D., Elizabeth.
Third Vice-President, ... ELIAS J. MARSH, M.D., Paterson.
Treasurer, ... GEORGE P. OLCOTT, C.E., East Orange.
Secretary, ... JAMES A. EXTON, M.D., Arlington.
Chairman Standing Committee, ... H. M. HERBERT, C.E., Bound Brook.

FIRST SESSION.

The Twenty-ninth Annual Meeting of the New Jersey Sanitary Association was called to order by the Chairman of the Executive Council, H. M. Herbert, C. E., of Bound Brook, in the assembly-room of the Laurel House, Lakewood, N. J., at 4:15 P. M., Friday, December 4th, 1903.

Mr. HERBERT—The Twenty-ninth Annual Meeting of the New Jersey Sanitary Association will please come to order. The Executive Council, after due consideration, decided to hold this meeting in Lakewood, which has become a second home to the Association owing to the many pleasant meetings held here. The Council has also endeavored to give you a program which would prove both interesting and instructive. We have with us a number of prominent men, who will discuss the papers, and I hope you will all take an active part in the discussions. Dr. Schauffler, of Lakewood, will give us a few words of welcome.

Dr. W. G. SCHAUFFLER—It is with great pleasure that I welcome you to Lakewood again. I think the work of the Sanitary Association is most important, not only to New Jersey, but also to neighboring States. I spent a part of last summer outside of the State, not far from New York, and I found that the work is known outside of our State, the papers and topics presented here being taken as standards by others. In welcoming you to Lakewood I hope it will be a very pleasant visit for you all, and that this will be the most profitable meeting the Association has ever had.

Dr. JOHN L. LEAL, PRESIDENT—We will take up the first paper on the program, "Sanitary Inspection Service," by Dr. G. K. Dickinson, of Jersey City, N. J. (For paper by Dr. Dickinson see subsequent pages.)

THE PRESIDENT—The discussion on this paper will be opened by Dr. Henry Mitchell. (For remarks by Dr. Mitchell see subsequent pages.)

THE PRESIDENT—Are there any other gentlemen who wish to discuss this paper?

Dr. FERDINAND N. SAUER—We are much indebted to Dr. Dickinson for his excellent paper on a most important subject. The paper probably touches the most important sanitary subject in New Jersey. As chief deputy health inspector of Jersey City for several years I have had opportunity to study the various conditions which the paper brings out. I have always felt that the New Jersey State health laws are defective. Not that they conflict with one another, but they promote a tendency to too great a variety of ordinances in different cities throughout the State. I suggest that a general revision of the State health laws be made, so that they will operate alike throughout the cities of the State. Before leaving Jersey City the mayor expressed to me his desire to have a board of health in Jersey City similar to that in operation in Newark.

Dr. E. E. WORL—I think we have in the State of New Jersey one of the best set of laws we could have. It was drawn by an efficient man, Judge Lanning, of Trenton, and under that law we have power to create these ordinances under which any sanitation can be undertaken. There is one thing necessary in local boards, and that is backbone. We have enough law; what is necessary is the enforcement of the law. We are crowding our statute-books with too much law.

M. N. Baker, C. E.—I understood the author of the paper to state there are only two bacteriological laboratories in New Jersey. Was that correct?

Dr. Dickinson—I said as far as I had discovered.

Mr. Baker—We have, in Montclair, a laboratory connected with the board of health, and there may be others. The laboratory work of our board has been of very great help, and as we do work in Montclair it is quite indispensable.

The President—The next topic is the "Medical Supervision of Pupils of Public Schools," by Dr. William S. Disbrow, of Newark. Dr. Worl, I believe, will read that paper. (For paper by Dr. Disbrow see subsequent pages.)

The President—The discussion on Dr. Disbrow's paper will be opened by Dr. Joseph Tomlinson, of Bridgeton. (For remarks by Dr. Tomlinson see subsequent pages.)

The President—The paper is open for discussion. Does any gentleman wish to discuss this paper?

Dr. Austin Scott—I would like to ask a question if I may. By physical instruction and education did the doctor mean that the mind should be trained to understand the subject or that the body should be trained?

Dr. Tomlinson—I mean that the bodies should be trained.

Dr. Scott—I want to express my gratification at what the last speaker has said in regard to the crowding of subjects. I think we are, in America, making an experiment in that respect. What the speaker said in regard to the training of power rather than knowledge meets my strong approbation.

Dr. H. H. Davis—I have listened to this discussion with a great deal of thought and interest. It has been my good fortune to have been medical inspector of schools in Camden for the past five years. When we started to give instruction in physical culture in the schools some of the members of the board said it was all nonsense. We put a number of the children in one division and gave them physical instruction, and put some in another division and did not give them any instruction on that subject. Statistics were kept and compared at the end of six months, and when they were shown to the members of the board they immediately said give

the instruction to all of the children. It is one of the most important subjects to be given to the child, as it fits the mind for study. A great deal can be done by the teachers, and too many medical inspectors cannot be employed, as the tax-payers are likely to object to the cost. Too much cannot be said in behalf of the teachers who enter into the work. Some teachers attend to the work as carefully as it can be done by any physician. We have an unvaccinated community of about ten per cent. of children at the present time, and we would have had them vaccinated if we had not had a scare in regard to tetanus. Slates are almost entirely excluded from the Camden schools at present. We have a receptacle in which there is a little spring to hold each pencil, and each child is now given a number, and the pencil is numbered and put in the box, and each child has its own pencil every day. It is my pleasure and privilege to state that in the whole of our epidemic of small-pox we have not had a single case of the disease occurring in the schools. I think this is entirely due to the assistance of the teachers in securing vaccination of pupils.

The President—Will Dr. Worl close the discussion?

Dr. Worl—I think the sentiment of the people is in favor of this system. We only need a little more money to spend. Of its usefulness there is no question. I must say that in the line of contagious diseases it has not, in some respects, met expectations, but everyone knows we cannot make diagnosticians of teachers. I think the present system of teaching physiology is impracticable.

The President—Our next order of business is the report of the Committee on Garbage Disposal. It will be given by Mr. Baker, the chairman of the committee.

M. N. Baker, C. E.—I have only a very brief report to give. There have been no marked changes in the methods of garbage disposal within the last year, and none, in fact, for several years past, particularly so far as this country is concerned. The improved methods of disposal are being introduced gradually in different cities throughout the country. Something is being done in this way in New Jersey, but not a great deal as yet. I would like to lay emphasis on the fact that garbage disposal is an engineering problem, and that it is rarely, almost never, so considered by our municipalities. When we look at it in

this light, and view the subject in that way in our cities, we shall see much-needed reformation. I am also more and more impressed as time goes on that the collection and disposal of garbage has far less relation to public health than we were heretofore led to believe. So far as health matters are concerned in point of time and money we might far better give our time to other things. I may add, in view of the discussion which was just closed, that I think our municipalities would get from ten to one hundred times more returns from a health standpoint by introducing medical inspection of schools than by spending money on garbage disposal, which I think is a question of public convenience rather than a question of public health. In conclusion, would say that I have a paper prepared by Mr. Goodell, which I will submit but will not read now. (See subsequent pages.)

GEORGE P. OLCOTT, C. E.—I move that the remaining reports of committees be laid over until to-morrow morning. This motion was carried.

THE PRESIDENT—The next will be the Treasurer's report. (For report see subsequent pages.)

THE PRESIDENT—Are there any communications, Mr. Secretary?

A communication in relation to rabid dogs was read by the Secretary. A letter from the Secretary of the American Congress on Tuberculosis was also read. On motion these communications were referred to the Executive Council.

THE PRESIDENT—The Executive Council will meet after the adjournment of this session. Any gentlemen present who wish to become members of the Association will please hand in their names.

A motion to adjourn was made and carried.

EVENING SESSION.

The evening session was called to order by the Vice-President, M. N. Baker, C. E., of Montclair, at 8:30, and prayer was offered by the Rev. C. P. Butler, of Lakewood.

THE VICE-PRESIDENT—We shall now have the pleasure of listening to the President's address, "Present Attitude of Sanitary Science." (For address of the President see subsequent pages.)

THE PRESIDENT—I have closed the shortest President's address ever presented to this Association, but when you look at your program and see what is to follow, I am sure you will thank me for my brevity. The next topic will be "Present Attitude of Education Toward Sanitary Science," by Dr. Austin Scott, President of Rutgers College. (For address by Dr. Scott see subsequent pages.)

THE PRESIDENT—For many years at meetings of our sanitary associations we were in the habit of expressing regret because we had no national health service. To-day we have a national health service organized and doing efficient work, and its efficiency and success is largely due to Surgeon-General Walter Wyman, of Washington, D. C., whom I take pleasure in introducing to you, and who will speak to us on "The Present Attitude of the National Government Toward Sanitary Science." (For Dr. Wyman's address see subsequent pages.)

THE PRESIDENT—Our next topic is "Present Attitude of the Law and Courts Toward Sanitary Science," by Judge John A. Blair. (For paper by Judge Blair see subsequent pages.)

THE PRESIDENT—I am sorry to announce that the Hon. George Wurts, who was to have spoken on "Present Attitude of the Press Toward Sanitary Science," is unable to be present on account of illness in his family, and we will therefore take up the next topic, which is "Sewage Disposal in New Jersey," by Mr. Hering. We will be glad to hear from Mr. Hazen, as Mr. Hering is not in the room at present.

ALLEN HAZEN, C. E.—Mr. President and gentlemen of the Association, I will occupy the few minutes until Mr. Hering returns. I was interested to learn from Judge Blair that it makes an important difference in one's view of sewage purification as to which end of the river you live at, and there is a wide difference between the necessity and the facilities for sewage purification. The southern part of the State is well adapted to sewage purification, and it is all ready to put the sewage on. All that it is necessary to do is to provide works for distributing the sewage over it and for carrying the effluent away. The land is useless for other purposes and everything is favorable. In the upper part of the State, on the other hand, is the population and the sewage, and there is difficulty in taking care of it. In these days when

cities are going so far for water, it would seem within the bounds of possibility to carry the sewage a corresponding distance, but that costs money. There are cheaper ways to get rid of the sewage, and it is much cheaper to put it in tide-water, and that seems to meet all present purposes. Mr. Hering has arrived and I will not take any more time.

RUDOLPH HERING, C. E., was introduced and presented a paper on "Sewage Disposal in New Jersey." (For paper by Mr. Hering see subsequent pages.)

THE PRESIDENT—I will call on Mr. J. J. R. Croes, C. E., of New York city, to speak on this subject. (For paper by Mr. Croes see subsequent pages.)

THE PRESIDENT—I will next call on Mr. C. C. Vermeule, C. E. (For paper by Mr. Vermeule see subsequent pages.)

THE PRESIDENT—We will hear from Mr. J. Waldo Smith, C. E. (For remarks by Mr. Smith see subsequent pages.)

THE PRESIDENT—Mr. E. W. Harrison, C. E., will speak to us on this subject. (For remarks by Mr. Harrison see subsequent pages.)

MR. VERMEULE—Mr. Harrison speaks of the advantages of feeding fish and oysters on this sewage. I would like to know if he thinks this is the proper food for oysters.

MR. HARRISON—We stopped the production of oysters in New York bay about thirty-five years ago and there are no oysters there, but New York bay is all right so far, as it has not reached the point of saturation. They catch good weak fish in the bay.

A. J. GAVETT, C. E., of Plainfield, stated that the Plainfield sewage disposal plant, consisting of septic tanks and double contact beds, is proving satisfactory; in fact, is considered by some of our visitors to be the largest and best example of this system of disposal in this part of the country.

The quantity of sewage is now over 800,000 gallons per day; the number of connections is now 1,775.

The method of operating the contact beds is to allow each bed to fill for two hours, then to stand full two hours; two hours are allowed for emptying and two for standing empty for aeration.

The sludge on the bottom of the septic tanks accumulates very slowly, but the scum gathers so rapidly that the tanks are emptied about every four months.

The President then invited Mr. F. H. Snow, C. E., of Boston, Mass., to speak on the subject.

MR. SNOW—I thank you for the invitation to speak, but the hour is getting late, and while I have had a large experience in Western cities and should like to give you a few words, yet I will not burden you with them to-night, because it is so late. These problems of sewage disposal can be met successfully, but they are expensive.

On motion the evening session adjourned.

THIRD SESSION.

The third session was called to order by the President at 10:15 A. M., December 5th, 1903.

THE PRESIDENT—The first topic is "Isolation of Infected Persons," by Dr. George E. McLaughlin, of Jersey City. (For paper by Dr. McLaughlin see subsequent pages.)

THE PRESIDENT—If Dr. Hunt is not here, then this paper is open for general discussion.

DR. MITCHELL—How shall isolation be accomplished? It is too common in many districts in this State to isolate persons who are not infected and who are not needed as nurses or attendants upon the patient. Under no circumstances can this course be justified. When the father of a child sick with diphtheria is required by a quarantine order to remain in-doors he will not do it. If he is restrained by the guards he will go out at night, or if he disregards them, as is generally the case, he will go out at any time. It is unwise to quarantine such persons, and the public health does not require it. The writer of the paper has spoken of periods of isolation with great definiteness. I think it desirable to know upon what experience or facts the statements are based. Of course, we have suggestions in the text-books which we are accustomed to rely upon for periods of isolation, but in a great many cases it is best not to follow these too closely, and a very good rule in cases of small-pox is to discharge the patient as soon as the scaling has entirely ceased and the redness has disappeared from the bottom of the pits, and there may be modifications of the rules given in cases of diphtheria. I do not think we can be too definite in fixing the limits of the periods of infectiousness.

THE PRESIDENT—Dr. Roberts, the Association would be pleased to hear from you on this subject.

Dr. Charles F. Roberts—I don't think I need to say anything, as I agree with the statements which have been made.

Dr. E. E. Worl—It is a very important subject. As I listened to the statements in regard to incubation periods I was a little uncertain myself. In regard to typhoid fever being placed at fourteen days, I have known it to be three or four weeks. Diphtheria may have an incubation of from one to three days. It seems to me we can isolate no disease which does not carry some considerable mortality. Chicken-pox has an incubation of from thirteen to seventeen days, and it is a disease which often prevails when small-pox is prevalent, but who can get chicken-pox isolated? I think we ought to study how to isolate diseases. Consumption is a disease that we should carefully study on account of its great mortality. It seems to me it ought to be isolated.

The President—If there are no further remarks, Dr. McLaughlin will close the discussion.

Dr. McLaughlin—In closing I wish to say that in giving a list of incubation periods I said that no period of time should be regarded absolutely. There is no doubt there are varying lengths of time, but there should be, to my mind, some standard which should not be regarded too closely, but be taken as a working basis for sanitary inspectors. They must have some idea of it, as they have not the education of physicians. I think they should be given some table of that nature. The periods which I gave I obtained from many sources, and in many cases from different physicians. Dr. A. L. Doty and other men of experience in sanitary work very kindly helped me out in this.

The President—The next in order is a paper on "The Mosquito Parasite." Dr. C. W. Stiles is not here on account of illness, but Prof. John B. Smith will speak on the subject. (For remarks of Prof. Smith see subsequent pages.)

The President—The subject is open for discussion.

Dr. Thomas N. Gray—I cannot discuss the subject in relation to the intestinal parasite, but will say something in regard to the location of the mosquitoes and of the possibility of exterminating them. We have in the Newark board of health a committee called the "Committee for Mosquito Extermination." That committee was organized for the purpose of going ahead in the work just so far as we know what we are about. Taking into consideration the

fact that Prof. Smith is dealing with large areas, it occurred to us that there was a large portion of the work to be done by local boards of health in their local districts, as there are pools of stagnant water in every community. It has been shown that the mosquito larvæ cannot grow except in water, and that being the fact, the solution is a very simple one—destroy their habitat and you destroy the mosquito. Experiments show that the ditching of the meadows has resulted in a reduction of the number of mosquitoes. The work we propose to do is one in which we expect to go to the Legislature, and have an amendment to the law which we have now which will give power to local boards of health to condemn stagnant water which contains mosquito larvæ, leaving the details of dealing with the question to local boards of health. We wish to enlist all those who may be interested in the extermination of the mosquito.

Dr. S. E. Armstrong—As you know, I came to Lakewood as a representative of the State Medical Society to attend a meeting of the committee appointed at the last meeting of the Society to take this matter up. I have had an interest in the subject for something over two years. In the meeting of the State Medical Society held two years ago last summer I read a paper on this subject, and when a committee was appointed to take up the subject I was made chairman of that committee. I wish to say that I believe the medical profession approve the methods and will follow the lead of Prof. Smith in this matter. We had a meeting of our committee here this morning, and some steps have been taken which, I believe, will result in a great deal of good. I believe if all the members of our committee will hold meetings in their respective towns, and ask the professor to come and address them on the subject, something would be gained by that. I asked the professor to come to Rutherford, which he did, but am sorry to say the meeting was not very well attended. If the professor could induce the mosquito to be active all the year round, a great deal would be gained, as many people go away during the summer and forget about the subject when they come back. I believe the time is coming when we will have a practically mosquitoless New Jersey.

The President—Is there any further discussion? The next in order will be a paper on "Laboratory Investigations for the Protection of Public Health," by Dr. R. B. Fitz-Randolph, Director of the State Laboratory of Hygiene. (For paper by Dr. Fitz-Randolph see subsequent pages.)

THE PRESIDENT—I have received a telegram from Dr. Kinyoun regarding his inability to be present. As he is not here, this paper is open for general discussion.

DR. GEORGE E. MCLAUGHLIN—The examination of milk for fat, as the director says, is not being conducted, but I hope it will be in the future, for I think it a very desirable thing to do. The examinations of blood, sputum, etc., are frequently misunderstood by physicians who receive reports, especially negative reports. I have found that physicians sending in specimens of blood from cases of typhoid fever, and receiving negative reports from the laboratory, decline to take the reports as an indication of no typhoid fever. I fancy that in some cases the results of the laboratory work are somewhat looked down upon on that account as they do not fully understand the report. I have seen cases of typhoid fever where the evidence has been absent until the third week, and a physician sending in specimens and receiving negative reports is apt to misunderstand them. The inspection of the milk supply, I think, should be looked after, but perhaps it comes under the sanitary inspector's work. I am impressed with the idea that perhaps scarlet fever may be spread by a disease of cows. Most of us have read of such cases. It is rather interesting to know that where this disease of cows is unknown scarlet fever is also unknown.

THE PRESIDENT—Any further discussion, gentlemen? If not, we will take up reports from committees left over from yesterday. The report of the Legislative Committee will be given by the chairman, Col. G. P. Olcott.

COL. OLCOTT—The Legislative Committee have no special report to make.

THE PRESIDENT—The next is the report of the Committee on Animal Diseases and Animal Foods, by the chairman, Dr. W. H. Lowe. (For report by Dr. Lowe see subsequent pages.)

THE PRESIDENT—The next will be the report of the Committee on the Improvement of Sanitary Inspection Service, by Dr. Dickinson.

DR. DICKINSON—I think it hardly necessary to make any further report, as Dr. Mitchell reported quite fully yesterday. We all used our influence during the last session of the Legislature to have the bill relating to this subject passed, and were successful.

The President—The report of the Committee on Civic Sanitary Societies, Rev. Adolph Roeder, chairman, will be read by the Secretary. (For report of this committee see subsequent pages.)

Dr. English—I move that these reports be received and referred to the Publication Committee.

This motion was carried. The President called for the report of the Auditing Committee, and the Secretary stated that the committee had examined the Treasurer's book and found his accounts correct, the amount on hand being $98.18. A communication from the "Independent," Sussex, New Jersey, was read by the Secretary, and also the report of the Executive Council nominating the following persons as officers for the ensuing year:

President, M. N. Baker, C. E., Upper Montclair; First Vice-President, N. L. Wilson, M. D., Elizabeth; Second Vice-President, Elias J. Marsh, M. D., Paterson; Third Vice-President, H. M. Herbert, C. E., Bound Brook; Secretary, James A. Exton, M. D., Arlington; Treasurer, Colonel George P. Olcott, C. E., East Orange; Chairman Executive Council, H. B. Francis, Camden; Members of Executive Council, the above-named officers and D. E. English, M. D., Millburn; William J. Harrison, Lakewood; W. H. Shipps, M. D., Bordentown; T. Frank Appleby, Asbury Park; T. W. Harvey, M. D., Orange; H. C. H. Herold, M. D., Newark; John W. Griffin, Arlington; A. Clark Hunt, M. D., Metuchen; R. H. Parsons, M. D., Mount Holly; M. R. Sherrard, C. E., Newark; A. W. Bailey, M. D., Atlantic City; J. B. Duncklee, C. E., South Orange; G. K. Dickenson, M. D., Jersey City; Stewart Hartshorne, Short Hills; W. G. Schauffler, M. D., Lakewood; T. N. Gray, M. D., South Orange; George E. McLaughlin, M. D., Jersey City; H. H. Davis, M. D., Camden; Joseph Tomlinson, M. D., Bridgeton; Charles J. Fiske, Plainfield, and the ex-Presidents of the Association as honorary members.

The President—You have heard the nominations of the Executive Council. What is your pleasure?

On motion it was ordered that the Secretary cast the ballot electing the officers nominated by the Executive Council. The Secretary then read the names of the committees, and on motion he was ordered to cast the ballot electing these committees. The Secretary reported that he had cast these ballots, whereupon the President declared the officers and

committees elected. (For list of committees see second page of cover.) It was also ordered that if any communication was received from St. Louis in regard to a sanitary convention in that city it should be referred to the President, with power. The Secretary then read a list of new members.

On motion the new members were declared elected.

THE PRESIDENT—Any further business? If not, a motion to adjourn is in order.

MR. BALDWIN—I move that the thanks of the Association be extended to the manager of the Laurel House for his courteous attention. This motion was carried and the Association on motion adjourned *sine die*.

Treasurer's Report.

GEORGE P. OLCOTT, *Treasurer, in account with* THE NEW JERSEY SANITARY ASSOCIATION.

1902.	RECEIPTS.		
Oct. 24.	To balance cash on hand,		$99 17
1903.			
Dec.	To dues received to date,		194 00
			$293 17
1902.	DISBURSEMENTS.		
Oct. 25.	James A. Exton, Secretary, expenses,	$10 90	
	W. H. Spence, printing,	24 75	
	H. B. Willis, expenses, stereopticon,	5 00	
	Charles Merrill, stenographer,	18 00	
	Laurel House, Association expenses,	18 75	
Nov. 19.	H. C. Weeks, expenses,	6 20	
1903.			
April 4.	Treasurer, postage,	3 24	
	D. C. English, Publ'n Com. expenses,	5 85	
13.	MacCrellish & Quigley, printing reports, etc.,	85 40	
May 2.	J. A. Exton, Secretary, expenses,	11 80	
Sept. 15.	W. H. Spence, printing,	4 00	
Dec. 1.	Treasurer, postage,	1 10	
			$194 99
	Balance cash on hand,		$98 18

Respectfully submitted,

GEORGE P. OLCOTT,
Treasurer.

PRESIDENT'S ADDRESS.

The Present Attitude of Sanitary Science.

JOHN L. LEAL, M.D., OF PATERSON, N. J.

All science may be divided into two main classes, that which is exact and that which is not exact.

Though it is possible therefore for a science to be a true science and yet not be exact, still its chief aim should be to develop into the first class as rapidly as sound and established facts or theories shall allow the necessary deductions or inductions, or, at least, to approach as closely as possible to the ideal. To fail in this effort is to fall below the standard demanded by true science of every honest follower.

There comes a time in the life and history of every such science when it is but right for its followers to pause, to consider what is past, what is and what is to come; to seize hold of what is vital and known to be true, and to cast aside all the mistaken facts, the false premises, the fallacious reasoning which cling to it and which cannot be made to answer true scientific requirements.

It seems to me that such a period has been reached in the life of the science of which the members of this Association are followers; that its present attitude is one of self-analysis; that it is separating the chaff from the wheat, is breaking loose from vague generalizations and mere theories based upon false or uncertain premises; and that it is now basing its claims for consideration entirely upon certain facts, few though they be, yet proven, accepted, scientific, and the principles scientifically evolved from them.

Though this be the attitude of the science and of its more advanced followers at least, unfortunately it is not as yet understood or appreciated by even the intelligent and educated public.

One great battle has been fought and won by sanitary science, another as important is now on.

The first was for recognition, for an opportunity to demonstrate the benefits and blessings this fair young science came bearing in its hands, to prove the better health, the longer life, the greater happiness which would come to humanity by their acceptance. That the victory was complete cannot be denied.

It is proved by the great engineering works constructed in its name, by the incorporation of its principles and conclusions into law, by the story told by statistics, and by the general popular support of its teach-

ings. It was so complete indeed that it may be said to be the indirect cause of the second battle which is now on.

Owing to our almost utter lack of exact knowledge, sanitary science was made to include much which our better knowledge of to-day proves to have had no place under its banner. Our premises were for the most part wrong, and of necessity the conclusions based upon them. The term was so broad, however, in what it included that it could not but include the truth, even though at that time unknown, and the truth, though hidden, brought forth the results.

The general public, seeing these results and appreciating their importance, attributed them naturally to the apparent causes rather than to the true ones concealed beneath the mass of extraneous matter which had accumulated under the name. In order to maintain these results, therefore, and to obtain even greater, it insists upon premises being supported, conclusions being maintained and measures being used which the more exact knowledge of to-day eliminates entirely from true sanitary science. In other words, the public to-day demands from sanitary science more than it, recognizing its limitations, can conscientiously give.

The battle, then, which is now on is to teach the public those limitations; to show it the facts now known to be the only allowable premises upon which we can base scientific conclusions; to teach it the results which can reasonably be expected, and the measures by which such results can be obtained. It must be taught that certain premises hitherto maintained are founded upon error and that the conclusions based upon them are false; that certain measures called sanitary, and for so long regarded as of vital importance, have really no relations to the public health, or at least are only of indirect or slight importance.

It must be shown, on the other hand, that certain facts are known which allow of scientific conclusions being drawn from them; that certain measures based upon these facts and conclusions can give us definite and positive results when properly and scientifically applied. It must be shown that the day is past when almost anything which may be for the benefit of the human race from the æsthetic, moral or financial standpoint may be demanded upon the ground of the public health. It must be shown that the public health is threatened only by a certain few things; that these things are known, that the various ways in which they threaten the public health are known, and that the methods by which such dangers may be averted are known.

These things must be taught not alone as abstract principles, but we must get down to the concrete instances. We must teach that the great sanitary bugbear of the past—filth, filthy water and filthy air—are in themselves of little sanitary importance, and that measures directed against them alone, however commendable they may be, are not demanded by sanitary science.

True sanitary science wars against infection whether it chances to be in filth or in purity, in filthy air or water or in that which is pure. It is just as dangerous, if not more so, in what is pure as in what is

filthy. The measures used against it may incidentally aid in accomplishing other good things, but their prime and true object is the destruction of the infection.

The converse is also true that measures which properly belong to public decency, public comfort and public policy may also incidentally aid in the fight against infection. In these mixed measures, however, the part which is sanitary should be carefully distinguished from what belongs to some other branch of good work. It should be understood that street sprinkling is a sanitary measure only in that it lays infected dust; the other good things it accomplishes do not belong to sanitary science; that a sewage system is a sanitary measure because it carries away the infection of typhoid fever and cholera. If such infection was not carried by sewage, then it could not properly be called a sanitary measure. The purification of drinking water is a sanitary measure in so far as it removes the germs of typhoid and cholera; its removal of color and of organic and mineral matters are entirely outside of sanitary science. The drainage of wet lands is only a sanitary measure in so far as it removes the breeding places of disease-carrying mosquitoes.

Then it should be taught what are the true and most important sanitary measures, and that they deal with the source and distribution of infection and its entourage. It should be shown that it is a very roundabout and ineffective way to fight tuberculosis by preventing dust, and to ignore the patient, who is the source of danger and the distributor of infection. That sewage systems and water purification plants are required in the prevention of typhoid and cholera, because the sewage and the water are allowed to receive the unsterilized discharges of patients suffering with these diseases, whereas true sanitation demands the direct destruction of the infection before it can gain access to such sewage and water. That the mosquito is a menace to the public health because it is allowed access to the patient and to become dangerous through him.

In short, that the true scientific sanitary measures of to-day are observation, diagnosis, isolation, quarantine, vaccination and inoculation and sterilization, and that these measures are to be applied directly to the patient and his immediate entourage. Under the old vague ideas of infection and its methods we have neglected the individual who was its source, and have striven to check the infection allowed to spread from him to the public by general measures. We have looked on and allowed the match to burn, and then devoted our efforts to the extinguishing of the flames of the house. Sanitary science to-day demands that we put out the match. It demands definite results by means of definite measures based upon definite conclusions from the definite facts of a specific science.

To sustain it in this attitude requires the support of such organizations as this and the individual support of every honest follower. It will require effort, for error once accepted is hard to uproot, but through education, through government, through law and through the press this victory may be won as was the first.

As a result of that the public to-day is demanding protection to its health in no uncertain tones; the only trouble is that it does not understand on what the public health depends and the means by which it can be protected.

Only teach it these two things and it will do the rest. But that the result will repay the effort there can be no doubt.

If sanitary science has been able to accomplish what it has with sword sheathed in ignorance, how much more effective will be the naked blade! For every reason the future promises more than the past. For its successful advance, however, one thing is absolutely required, and that is a specially educated and trained executive force. As it has become more exact as a science, it necessarily requires more exact instruments.

In the beginning the science was built up, guided and put into effect by physicians. Then, as its efforts came to be directed rather toward the mass than toward the individual, and as various public and individual benefits were mistakenly demanded in the name of the public health, the engineer, the architect and the plumber rather pushed the physician to the background. The pendulum of time, however, seems now to be again swinging back toward the physician as we realize as never before the supreme importance of dealing with the individual.

The time is past, however, when anyone has a right to be considered a practical sanitarian simply because he is a physician, an engineer, an architect, a bacteriologist or a chemist. Sanitary science demands to-day for its service the expert, educated and trained for its special work. Supply this demand and it will serve humanity as never before.

Address on the Present Attitude of Education Towards Sanitary Science.

By President Austin Scott, of Rutgers College.

Mr. President, Ladies and Gentlemen:

"Who is the freest man?" is a question which I asked this morning of the members of our Freshman Class who are studying the subject, "Civics." Is he the man out on the plain, the savage, the ranchman, the hermit, or is he the man in the midst of a densely populated section, in the heart of a large metropolis? The answer of the Freshmen, found in Blackstone, was that the "freest man is the one who is a reputable member of society and enjoying natural liberty so far restrained, and no farther, as is necessary and expedient for the general advantage of the public." Many of the present-day signs may well lead us to the

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conclusion that the American people must learn again in this generation what constitutes real freedom. Our fathers were country folks when they made our constitution and the early laws growing out of it. The problems of that time were rural problems, not those of the city. Are we to be as free under present and future conditions as they were two, three and four generations ago? Colonel Prout, the editor of the *Railroad Gazette,* in a lecture before the students of our college on "The Future of the Civil Engineer," asserted that the railroads of the country, now nearly two hundred thousand miles in aggregate length, must all be rebuilt: the rails trebled in weight, the curves straightened, the grades made easier and grade crossings abolished; in short, that science must replace the old rule-of-thumb construction, the only one, however, for the most part, in the early days possible. So we, the American people, must adjust ourselves to a new idea of freedom, and so become by a double title "the owners of our liberty;" must know with a settled conviction that lawlessness is not liberty, that freedom is the child of law. A goodly part of that lesson is to be taught through the efforts of this Association and similar bodies. That men who are controlled by laws adopted in the interest of true sanitation may be the freest people; and we are especially to learn this lesson here in New Jersey, where the population is, and is to be, so very dense. We are to learn here that the man enmeshed in the law, whose house is constructed according to strict ordinances, whose plumbing is done under inspection, many of whose household and school and business interests are examined by legally appointed experts, may well be in point of opportunity and privilege the freest man.

But perfect sanitation, and the laws seeming to restrict, but really to bring larger opportunity for the exercise of the powers of man, and perfect obedience to these laws will not come in our day. "Knowledge is power," but ignorance is a fearful force. A full head of steam will not start the train if the breaks are on; the inert mass will not move. Yes, the country is "growing better," but it is also growing worse, for the powers of evil are keeping pretty even pace with the powers that make for righteousness. We may not therefore lose courage. Our duty, while it may lack the promise of success, is none the less clear; it is the rather more plain.

Education and enlightenment, that is, the special training of the expert in his field, the wisdom of the scientific man, are not to be expected of those who are the subjects of enlightened legislation; but the taxpayer, the man of family, the teacher in the public school, should be trained to have powers of observation, but above all they are to be trained to have confidence in the law and in the man who executes it, such confidence as one has in a family physician.

As to the attitude of our colleges and universities and technical and professional schools in the matter of the careful training of the expert, an examination that I have recently made of catalogues and publications of various institutions, convinces me that there is a great deal to be desired. Training for specialists is inadequately provided. Mention

has been made of Rutgers College as the first institution in the United States to hold examination of candidates for the places of health officers and inspectors, but no real course of training has been provided, save as subjects for study were pointed out on which the examinations would be held and the sources of information and text-books indicated. In most of the institutions whose catalogues I have examined the subjects were treated as incidental and not as the main object for the pursuit of any would-be specialists. I trust that under the new New Jersey law we shall have a real educational movement toward this end. The matter is one of the highest practical and scientific importance. So far as the examinations which were held under the auspices of the college I have the honor to serve were of value, is to be attributed largely to Dr. Leal, the President of this Association; to Dr. Cyrus F. Brackett, to Judge Lanning and to our own Professors Van Dyck, Voorhees and Smith.

Mr. President, the attitude of education towards sanitary science is at present an attitude—that of waiting—and is not activity. So far as I am permitted to represent educational interests let me say that we are ready to be instructed by this Association and to be prompted to zeal and good works.

Perhaps the greatest lesson that the business interests in our generation has learned is that profits are to come through the saving of waste. From the lowest point of view, what greater profit could accrue to our State and to our country than by the carrying out of the purposes of this Association and similar bodies by saving to the working forces of society the lives, the health and the strength of myriads of men and that form of matter which unwise men throw away, that are every day going to waste?

Present Attitude of the National Government Towards Sanitary Science.

By Walter Wyman, Surgeon-General, U. S. Public Health and Marine-Hospital Service.

The present attitude of the National Government towards sanitary science does not differ, so far as I know, from its attitude in the past, but its activities are greater than heretofore, by reason of more favorable opportunities. So far as I can learn, the attitude of the general Government has always been, and is, friendly; this friendliness being manifested to a degree commensurate with its powers under the Constitution and with the wisdom of its sanitary advisers. Congress is neither indifferent nor niggardly when it is assured that the measures

proposed for the advancement of science are clearly within its constitutional prerogatives and that they have been judciously advised. It was formerly the complaint that Congress was more liberal towards sanitary science in its relation to the lower animals than in its relation to human beings, but the imputation was unjust, the reason for apparent neglect of sanitary science as applied to human beings being a want of harmony among the special advocates of sanitary measures. Congress and State Legislatures have been confused by the conflicting views of those interested in sanitary measures, and when this confusion exists legislative action is naturally deferred. Hence the necessity of most careful consideration and unanimity of action on the part of those who seek to obtain legislative action of this character.

So far as National legislation is concerned, I am pleased to state that the desired harmony among those interested in the attitude of the general Government appears recently to have been attained. This attainment will be referred to again. But I propose now to take a general survey of the field of National *administration,* and to briefly enumerate the various branches of the Government whose labors, directly or indirectly, advance our sanitary knowledge, it being understood that a number of governmental institutions have been established primarily for other objects than sanitary science, which, nevertheless, are powerful factors in its advancement.

INTERIOR DEPARTMENT.

For example, one might on first thought imagine that the great Interior Department of the United States Government has but slight relation to this subject, yet, through the Hydrographic Bureau of the Geological Survey our knowledge of streams and the influences which affect water-supplies is greatly enhanced, and is of value from the standpoint of sanitary science. The matter of irrigation and conservation of water-supplies, to which so much general attention is at present being given, and which comes within the special administrative duty of this same bureau of the Interior Department, has also a direct relation to sanitation.

Another bureau of the Interior Department, namely, the Bureau of Education, through its bulletins on subjects such as "The Sanitary Condition of Schoolhouses" and "The Means of Spreading the Knowledge of School Hygiene Among the People" further illustrates the helpful attitude of this Department. In the opening of new lands to settlement in the several territories the Interior Department has control of funds derived from the sales of public lands with a view to their expenditure for assurance of good water-supply and other sanitary provisions requisite for the towns and cities which develop so rapidly.

DEPARTMENT OF COMMERCE AND LABOR.

In the new Department of Commerce and Labor is the Census Bureau, some of whose compilations are of great value to sanitary science, and also the Bureau of Labor, which, though engaged primarily

in acquiring and diffusing information on other subjects connected with labor, nevertheless has issued valuable treatises such as "The Housing of Working People," "The Slums of Baltimore, Chicago, New York and Philadelphia," "Factory Sanitation," "The Effect of Various Industries Upon the Working People," and other publications having a bearing upon the great subject of sanitary science.

NAVY DEPARTMENT.

The Navy Department, through its Bureau of Medicine and Surgery, maintains in Washington a medical school for the advanced instruction of its medical officers, with which is connected a museum of hygiene in which are illustrated many principles of sanitary science.

WAR DEPARTMENT.

The War Department, through the office of the Surgeon-General, conducts a school for post-graduate instruction of its officers in which special regard is paid to sanitary work; and in the scientific investigations made for the benefit of the army, the general public has a direct interest and profits thereby, as illustrated in the valuable work of Reed, Carroll and Craig, with regard to yellow fever and malaria. The library of the Surgeon-General's office is of great value to those interested in sanitation and hygiene, as well as in other branches of medicine and surgery.

Very important stimulus is given to sanitary science by the Engineer Corps of the army. Its members are skillful sanitary engineers, as was well illustrated by the sanitary work in Havana at the close of the Spanish-American War, a work begun by General Ludlow, an engineer officer, and continued by Col. William M. Black, whose sanitary engineering, both as regards the city and harbor of Havana, deserves the highest commendation. To the skill and devotion of Colonel Black may be justly attributed in large measure the sanitary regeneration of Havana.

STATE DEPARTMENT.

The attitude of the State Department to sanitary science is illustrated by the cordiality with which the Secretary of State encourages representation by this Government at the international congresses of medicine, surgery and hygiene, to which the United States is frequently requested by foreign governments to send delegates. Further, under the act of Congress approved February 15th, 1893, the United States consuls throughout the world are directed to transmit to their home government sanitary information and reports, and to this requirement there is a very willing and generous response on the part of the consuls.

Quite recently, by request of the Public Health and Marine Hospital Bureau, through the Secretary of the Treasury, the Secretary of State has issued circular instructions directing the consuls at some forty-five foreign cities in Europe, India, South America, Australia and Canada

to obtain and forward the laws and regulations requiring the vacation of insanitary dwellings and the demolition of such buildings. This information is desired in the interest of the movement which is now going on in many of our cities looking to the absolute destruction of residences that, from a sanitary standpoint, are unfit for human habitation.

DEPARTMENT OF AGRICULTURE.

In the great Department of Agriculture several bureaus are directly or indirectly concerned with hygienic matters, and therefore with the advancement of sanitary science. The Bureau of Animal Industry, with its force of about 1,400 officers and employees, investigates the existence of communicable diseases in animals used for food by man and makes special inspection with regard to the same when entering into interstate and export commerce. It studies dairy products and methods and the milk-supply of cities and towns and the various laws relating thereto. The Weather Bureau supplies climatic data useful to the health-seeker and the settler. The Bureau of Plant Industry studies the poisonous plants and their antidotes, and the cultivation of drugs and medicinal plants. The Bureau of Chemistry, through its food laboratory, studies the composition, nutritive value and character of adulterations of human foods, and investigates the food preservatives and coloring matters to determine their relations to health. It also studies the composition and adulteration of drugs. The Division of Entomology studies the insects in relation to diseases of man and animal, a most important feature of modern scientific research with regard to the health of man, as instanced by the serious role which the mosquito has in recent years been found to play in the transmission of certain diseases.

TREASURY DEPARTMENT.

But the attitude of the National Government toward sanitary science is particularly and most directly shown by the establishment by Congress within the Treasury Department of a Bureau of Public Health and a Hygienic Laboratory, devoted, in the words of the law, "to the investigation of contagious and infectious diseases and matters relating to the public health." No broader foundation could be given by legislative enactment than is conveyed by the legislative words just quoted. The work of the Hygienic Laboratory of the Public Health and Marine Hospital Service is too well known through its scientific bulletins to require a detailed description. Suffice it to say that it is carrying out the intent of Congress so far as its present equipment will permit. It has four distinct divisions: 1st, bacteriology and pathology; 2d, medical zoology; 3d, pharmacology; 4th, chemistry. A new laboratory building has just been completed and other buildings will be asked for from time to time as their necessity becomes demonstrated. One feature of this laboratory is its advisory board for consultation with the

Surgeon-General, Public Health and Marine-Hospital Service, composed of the director and representatives of the medical department of the army, the navy, the Agricultural Department, and representatives from five of the principal laboratories of the United States not connected with the Government. It is believed that through this board co-operation will be secured with regard to the character of investigations to be made by the various principal laboratories of the United States. This hygienic institution is a natural outgrowth of the public health work of the Marine-Hospital Service, which work itself has naturally followed the performance of its quarantine functions, these latter being imposed on the Service because of its familiarity with ships and sailors.

On July 1st, 1902, the name of the Marine-Hospital Service was changed to that of the Public Health and Marine-Hospital Service, and its functions as relating to sanitary science were vastly increased. In the Administrative Bureau established by this law, one of the most important divisions is the Division of Scientific Research. In the same law provision was made requiring the Surgeon-General of the Service to call a conference of the boards of health of all the States and Territories at least once each year, thus bringing together the State and the National health organizations. It is through this conference that the desired harmony among those interested in the attitude of the general Government towards sanitary matters has been attained and which was referred to at the beginning of my remarks. It is confidently expected that this harmony will be maintained. Additional conferences, called either on request of the States or when the Surgeon-General deems it necessary, are provided for in the same law.

Another law recently passed requires an examination of all the establishments in the United States where vaccine is produced, or curative serums and antitoxins, to insure scientific accuracy and purity in their productions. The Secretary of the Treasury issues licenses to these establishments, or refuses to issue a license, basing his action on the reports of inspection made by officers of the Public Health and Marine-Hospital Service. Even foreign establishments must be thus examined and licensed in order to sell their products in the United States.

Mention should also be made of the Yellow Fever Institute, founded for the continuous investigation of yellow fever and organized to utilize the findings and personal services of any member of the medical profession at home or abroad. This institute is operated by the Public Health and Marine-Hospital Service under authority of the Secretary of the Treasury.

The interest of the National Government is further shown by the detail of medical officers to attend international sanitary conferences, such as the one now in progress in Paris relative to the bubonic plague, and the Government of this nation has joined with the governments of the other republics of America in providing for annual sanitary conventions and the establishment of an International Sanitary Bureau of American Republics permanently located in the city of Washington.

In closing I wish to emphasize the fact that the attitude of the legislative and administrative departments of the National Government in the matters under consideration is but the expression of the sentiment and will of the people of the United States. In other words, the progress of sanitary science and administration will depend upon the growth of public knowledge and demands. A strong public sentiment is an all-important factor in the development of scientific sanitary knowledge and better sanitary conditions in our towns and cities. Associations, therefore, such as the New Jersey Sanitary Association, are simply invaluable in enlisting public sentiment in support of sanitary laws and their enforcement. It was in admiration of this Association, whose proceedings have been sent me for a number of years, that I gladly accepted the kind invitation of your President to be present this evening, and I wish to congratulate both him and yourselves upon the good work of the Association and the good results which will doubtless follow its Twenty-ninth Annual Meeting.

Present Attitude of the Law and Courts Towards Sanitary Science.

BY JUDGE JOHN A. BLAIR, OF JERSEY CITY.

The subject, "The Present Attitude of the Law and the Courts Towards Sanitary Science," conveys perhaps a wrong impression, as though the law and the courts might occupy different attitudes towards the object of your Association. This, of course, is not so. The courts never differ with the law. Lawyers very often differ with each other about the law, and that difference is the bread and butter of the profession; and lawyers quite frequently disagree with the courts, but not so with the courts. They sometimes differ with the lawyers, but between the courts and the law there is always harmony. The relative conclusiveness of the opinion of lawyers and courts is well illustrated by a conversation between a bishop of the church and a judge as to their respective powers; the judge concluded the argument by saying: "Now, Bishop, when a clergyman says to a poor sinner, 'You be damned,' it is by no means certain that the poor fellow will eventually be damned; but when a judge says to a poor convict, 'You be hanged,' why hanged he is, and everybody knows it." So when the lawyer says so and so is the law, it is possible that it is not so, but when the court says what the law is, why that is the law, so there must be entire harmony between the courts and the law. Therefore what I say will be applicable to both law and courts, so far as applicable at all.

There must be a natural harmony between the attitude of the law and the attitude you take toward the purposes of your Association. Both forces are engaged in the same common purpose—the elevation of the human kind, both contributing to the ennobling of human relationships. You seek to discover and enforce the laws of physical soundness; the law as it is spoken of in the toast is the expression of the law-making power in establishing and enforcing the rule of sound moral action between individuals respecting their persons and their property. You attempt to attain physical soundness, the law seeks to establish and the courts to enforce moral soundness; you see, therefore, there can be no conflict between us. The law of physical sanity and the law of moral sanity are two pure streams gushing from the same eternal source, flowing onward with ever increasing volume, side by side, each like the river of the Apocalypse, whose mission was the healing of the nations. From the day when Moses, the great lawgiver of the Hebrew nation, ripe in all the accumulated learning of his age, gave laws to his listening people, proclaiming what they should eat as being clean, and what they should not eat as being unclean; what they should wear—and he recommended linen far in advance of Dr. Deimel—in order to preserve their bodies in healthfulness and their lives in cleanliness, down to the present moment, when the people of Paterson, aided by the professional weight and influence of your distinguished President, are trying to prevent the purification of the Passaic Valley in the way the Legislature thought it should be done. During all that period some at least of the subjects in which you are interested and advancing have engaged the attention of every civilized nation. For instance, you regard as subjects of great sanitary importance the thoroughness of municipal sewerage, the presence of a sufficient supply of pure and wholesome water and the necessity and frequent use of baths. Yet Rome at a date almost two thousand years ago had sewers in every street and the whole city was drained into the Tiber through the Cloca Maxima, large enough for one of the emperors to row through in a boat. At the time when her population was a million people she had a daily supply of 50,000,000 cubic feet of pure water carried to her through immense viaducts from her surrounding mountains. Of her public baths, of which at one time there were nearly a hundred, the greatest being those of Caracalla, almost a mile in circuit, and capable of accommodating 18,000 bathers at one time, a Roman historian speaks as follows: "The Thermæ are where are collected all the refinement of idleness and southern luxury. At all hours of the day the crowd gathers there seeking in the marble basins and the perfumed halls air and water at any temperature. There the body being well rubbed with oil and the limbs supple, the Roman walks slowly amid a population of statues, through gardens cooled by springing fountains, or takes his exercise in the Palæstra, where every kind of game is provided, or else, perhaps, he will prefer to read under a portico in some solitary corner, or listen in academic halls, adorned with precious mosaics, to rhetoricians declaiming, or philoso-

phers discussing, or to some poet soliciting for his lame verse the facile applause of an indolent audience." I imagine it will require all the persuasiveness of this Association and some years of labor to induce the Legislature of New Jersey to authorize boards of health to provide public baths with such luxurious appointments.

Our system of law is a superstructure of statutes imposed upon the foundation of the "Common Law," the common law being the name given to that considerable body of the law of England, which is unwritten, and receives its binding force from immemorial usage (1406) and universal reception, and is so called in distinction from the written or statute law. This common law being the law of England extended to us as an English colony and is still binding on us, except where it has been modified or repealed by the acts of our Legislature since we have become a State. There are many things in the common law defining and relating to sanitary matters, but these subjects have been generally treated by the statutes. The first act of a sanitary character that I recall as passed by the Legislature of the State of New Jersey is dated November 19th, 1799, something over a hundred years ago, and is entitled "An act to provide for the security of the citizens of this State against the introduction of contagious diseases," and it gave the Governor power, when applied to by the executives of the States of Pennsylvania and New York, to issue proclamations warning all citizens of this State from entering on board of or having any comunication with any vessel infected with any malignant disease lying in the Hudson or Delaware rivers; and all persons disobeying such warning should, upon conviction, pay a fine not exceeding $300.

The next act was passed in 1812. This law fixed the place of anchorage of all vessels arriving at Perth Amboy between May 31st and October 1st, in each year, from all points south of Georgia or from any points where pestilential fevers prevail. It also constituted the Mayor, Recorder and Aldermen of Perth Amboy a board of health, with power to appoint a health officer or physician to inspect all vessels arriving at Perth Amboy, and when found to be infected to direct them to be cleansed, ventilated and purified at the expense of the master of the vessel; and forbid all infected persons from landing (except the captain and master), and imposed a fine of $100 and two months imprisonment in case such orders were violated. These acts were probably suggested by an act of the English Parliament passed in the twenty-sixth year of George II., which provided methods for quarantining vessels and make masters of vessels coming from infected ports or having the plague on board and communicating it guilty of felony without benefit of clergy. From the Legislature of 1799, which passed one act, till the Legislature of 1903, which passed a dozen relating to sanitary matters, laws sufficient in number and volume to fill many pages on the statute-books have been enacted.

Those adopted for the furtherance and control of sanitary objects have generally taken the form of boards of health—state, county, city and other local boards, and these boards have been authorized to exercise their powers through the means of ordinances.

These boards of health have power under the law to make ordinances applicable to and enforceable within their territorial limits. Thus county boards have jurisdiction over the following matters, among others:

1. To provide against the adulteration of all kinds of drugs, foods and drinks and of meats and vegetables, and the sale of the articles so adulterated, which, I presume, is a distant echo of an English act nearly 700 years old, which prohibited the sale of corrupted wine or unwholesome flesh, and made the first offense punishable with fine and imprisonment; for the second offense, punishment in the pillory, and for the third, expulsion from the town;

2. To declare what shall be nuisances in all public and private places in the county, and to remove and abate them;

3. To provide against the spread of epidemic or contagious diseases;

4. To regulate or prohibit the carrying on any noxious or offensive trade, manufacture or business;

5. To provide and control the keeping of birds, beasts and animals, and the slaughter of the same;

6. To regulate, license and control the business of night scavengers and all dealers in fat, animal offal or refuse, and the drainage of privies, sinks and cesspools;

7. To regulate or prohibit the accumulation of manure in any public or private place;

8. To provide for the proper registration of all physicians, nurses and midwives;

9. To compel proper returns of all births, deaths, marriages, and generally regulate the keeping of a registry of the vital statistics of the county according to law;

10. To secure sanitary condition of tenement houses, prison and public buildings;

11. To regulate, control and prohibit the cleaning of sewers and dumping of garbage on lands within the county;

12. To provide for the filling-in of sunken lots which have become the repositories of stagnant and noxious waters.

These you see are very large and comprehensive powers, and in the enforcement of these powers these boards of health are authorized to impose penalties for violation of these ordinances and to institute legal proceedings for the recovery of such penalties, which, in some instances, include both fine and imprisonment.

Besides these laws vesting these large powers in boards of health to accomplish these usual objects of sanitation, others have been passed authorizing the establishment of large and costly hospitals where those having infectious and contagious diseases may be segregated, and thus, by isolation, prevent the further spread of the disease. In the year 1902 a law was enacted to establish the "New Jersey Sanitarium for tuberculous diseases," with power in the board of eight managers, of whom not less than four should be physicians, to select a site and erect suitable buildings thereon, and a large appropriation ($50,000) was made for that purpose. In 1902 another law was passed

authorizing the establishment and maintenance of free baths and gymnasiums in cities of this State and appropriating not less than $15,000 annually for such purpose, and Jersey City to-day owns and enjoys a very beautiful and commodious bath built under the provision of that law. Of course it is hardly as luxurious as those described by the historian for the enjoyment of the Roman populace, but it is a very progressive and substantial movement toward that condition of ideal sanitation of which we all hopefully dream.

I think it will appear from the little I have said that New Jersey has not been unmindful of her duty to her citizens in this respect, nor will it appear that she is far behind the most progressive of her sister States.

These laws, however, to which reference has been made, and others not referred to, though comprehensive as applicable to many subjects and capable of protecting in a large measure the public health, are not self-executing and of themselves are utterly impotent of results unless enforced, and I hope you will pardon the impudence of the speaker when he asserts that it is one of the most imperative duties of your Association to see that they are unflinchingly executed. The law-making power is not, as a rule, distinguished for initiative in matters of this sort, and it occurs to me also as some of the clearest duties lying within the province of your Association, with such view as you have of the whole field (subject), and with your knowledge of the insufficiency of the existing laws and the necessity for their enlargement, are to leave no public danger uncovered, to prepare bills covering the present deficiencies, and present them for passage to the Legislature. Any suggestion looking to the sanitary protection of the people of the State presented to the lawmakers, and urged by the intelligent and disinterested influence of this Association, would, I am sure, receive prompt and cordial recognition.

The attitude of the courts, as I have said, is in entire harmony with the progressive legislation of the State, and whenever any contest arises involving a sanitary law the courts will support the law unless there is a clear invasion of the Constitution, or it manifestly appears that the sanitary part of the law is trying to overcome the moral; for the courts of New Jersey, however partial they may be to the virtue of cleanliness, are not yet willing to give it preference over that of godliness.

Now, gentlemen, notwithstanding all that the law and the courts have done, are now doing, and will continue to do for you, and all that you have done and are now doing for the advancement of sanitary science, I am not quite so optimistic as to think that we are clearly within the dawn of that millenium when all men will be the happy possessors of that fortunate combination, a sound mind in a sound body; but I am quite willing to believe that if the ancient promise of a time when five men should chase a hundred and a hundred should put ten thousand to flight is realized, that the five and the hundred who accomplish its fulfillment will be men closely allied to some sanitary association such as this.

Sanitary Inspection Service in New Jersey.

By Gordon K. Dickinson, M.D., of Jersey City.

In the early ages, before rational medicine had been crystallized from the imperfect concept of disease then prevailing, the philanthropic and public-spirited endeavored to determine the reasons for personal as well as communal diseases and to apply rules more or less correct for their relief. That in some particulars the knowledge of the day was complete is evidenced by their acts which have come down to us. The law of Moses was strict as to diet and personal cleanliness, recognizing the danger of filth and the risk of eating flesh infected with trichinæ. Circumcision antedated him, for, though unwilling to have his son circumcised, it was done at the request of his wife, a Midianite. The Romans and Grecians built an elaborate system for water-supply, sewage disposal and public baths. The Hindoo and Chinese discovered and practiced inoculation for small-pox. These few instances prove the enlightenment of those times, but the failure to continue them also proves that there was not a proper understanding of their value by the masses. Not until medicine as a practice ceased to be embarrassed by association with religion did it rise above the low level at which it was held, and through research and observation and the recording of facts as seen did the ground become substantial for the modern profession of sanitation.

Though the discovery of the achromatic lens led to an advance along true scientific lines, yet the philanthropy and culture of the times made such advance permanent.

Sanitation is the science of health as affected by environment. Its province is to improve the latter, so that health may be promoted, life prolonged and mankind made more comfortable. It possesses no standard, but should possess a high ideal, and that ideal should be sustained.

The advances in hygiene and surgery, as well as the growth of hospitals, have advanced us so as to make this ideal possible. At first, moving along on special lines, sanitation made little advance, and often this advance was but a lesson learned from some public calamity.

To effectually apply the laws of sanitation several conditions must be complied with. Organization is first in importance, for without it the laws cannot be properly enforced and all would be chaotic. This problem has been solved differently in different countries.

The centralization of public health powers is advocated by some, but in this country it would be impractical, as the form of government is antagonistic. In a democratic country the unit should be the local board, and it should care for all matters pertaining to itself, and

be kept in harmony with the State board by official representation in it. Strangely, in health matters, the political tendency of the Eastern States and the South and West are reversed, for the local boards in the former are given more authority, and in the latter it is centralized in the State boards.

Members of State boards should be well trained and possess a superior knowledge of sanitation, so that they may properly decide on matters of State interest, and further, being less apt to be disturbed by personal interest, may act when local boards conflict or become, as is unfortunately often the case, apathetic from dry-rot.

In Mississippi the county board of health contains one physician appointed by the State board. In Alabama the State and county societies are the respective boards. In North Carolina the registered physicians in the county, together with the mayor of the county town, constitute the board. In North and South Dakota the State board of health appoints two men, who, with the district attorney, constitute the county board. In Connecticut and Texas sanitary matters are administered by a county health officer, and not by a board of health.

In New Jersey the State board is appointed by the Governor, and is composed of the Secretary of State, the Attorney-General and the State Geologist, with seven other members. The local boards are, with one exception, township or city boards. Previous to the law of 1887 there existed county boards throughout the State, which this law has superseded, where the local governing power has elected. In every county in the State this has been done with the exception of Hudson. In this county exists the anomalous condition of both county and municipal boards, which have at times led to a conflict of duty. The practical result of this is to put into the county board the registration of statistics and charge of county institutions, the attention of sanitary matters falling to the municipal boards. This want of harmony between the working methods of the general State and this county has materially interfered with its proper progress in sanitary work.

In municipal boards the same want of uniformity exists in its personale, civil engineers, politicians, aldermen, mayors, police, laymen of all opinions, with occasionally a physician. One has but to read Chapin's work on "Municipal Sanitation in U. S." to be impressed with the immense need of a better and more uniform organization of such boards; the police board of Jersey City is *ex-officio* the board of health acting with the inspector, who is not a physician nor a sanitarian, and one city physician. But as the law does not require a physician or accepted sanitarian to be connected with the local board as inspector, the results are as good as the police can make them and no better.

A corollary to organization is administration, a distinction being made between supervision and administration. This distnction is generally lost in speaking of the relation of State boards to the local ones.

To guide and direct the local boards by the central authority has not been attempted in the State. Generally it suffices to relegate to

the central board authority in general matters, as epidemics, river pollution where several towns are interested, the cause of disease, sources of mortality, statistics, etc. And if contiguous local boards cannot agree, to act as arbiter. Conservatism is essential in the relation of the several boards, and with expert men trained in sanitary matters in the State board, laws will be discreetly administered and public health favored. The *sine qua non* of good organization is efficient laws, trained men in the different bodies, and intelligent public interest.

Education is essential for the health officer as well as the public. No one should receive the appointment to a position on or with a board of health, State or municipal, without having proper qualifications, nor should an inspector be given any position until he has passed an examination which would test his ability to perform the duties of his office satisfactorily.

Civil service regulations are not yet in vogue in the laws of many States, but the need of a practical education is felt, and several institutions provide the same to some extent. The first college of sanitation existed in Prussia in 1780, which later became amalgamated with the medical college. Strangely we have not in these modern times any analogue. Rutgers College, in this State, and the Ohio University all have courses for health officers, and in Lafayette and the University of Pennsylvania there are excellent courses of hygiene. However, until politics cease to be a factor in appointments and the health officer feels that his work is a distinct profession, and not a money-making makeshift, will he be willing to devote time to educate himself when not compelled.

At the last session of the Legislature an act was passed emanating from this Association which makes for a large advance towards bringing the State to the front in progressive sanitation. It requires all future sanitary inspectors to have passed an examination held semi-annually by the State Board of Health. There will be three grades of certificates given, according to whether the applicant expects to qualify before a city or township local board. As a permanent tenure of office is implied by acquiescence in this act it should be popular.

A powerful means of helping inspectors in enforcing the laws and ordinances is to have the public intelligently comprehend them. This should be attempted, and may be accomplished by reports of the local as well as the central boards. But even better yet, by the issuance of circulars in several languages, instructing the laity in each matter requiring sanitation. In the larger towns, like New York, it has been successfully accomplished. In this State its use has been limited to the State board, which has not so extensively employed it as it might.

The most powerful means of education in modern times is the daily press, that country and that people being the most progressive which read the papers and popular magazines. The editors of these certainly appreciate their influence, and, if properly approached, would rise to the occasion and permit in their columns interesting and correct

articles on sanitary matters, which would do more to educate the public than the little hygiene taught in the schools or by the medical profession. The marvelous success made in abating the spitting habit in the cities is due to the activity and persistence of the daily press in exploiting the nastiness and the dangers of this nuisance.

Another feature which has an educational as well as a practical aspect is a well appointed and properly managed laboratory. The State board has an excellent one, so has the Newark board. But outside of these I find none mentioned. Their value to the professional public cannot be overestimated, and each large city, and even the smaller ones, would find it to their credit as well as convenience to have one well conducted in their midst. Valuable as the State Board of Hygiene may be, it is not convenient for the distant practitioner, although the educational value of such an institution is great. It should be so appointed as to make promptly the various bacteriological examinations necessary of sputum, dejecta and exudates, as well as to carry on a systematic analysis of the colon group by the culture method of the water-supply and such wells as exist. Chemical examinations of foods and drugs are also desirable.

Unless a board be properly financed its work will be mediocre, and fail to meet the desired end. Nuisances will not be abated and fines will be used as a means for income. The work of a well-organized board should be conducted by well-paid men, for no educated or trained man would be willing to work so for a small wage. Another feature of regret is the small crop of inspectors appointed to a special department. If the annual appropriation be sufficient this evil can be largely avoided. The law allows and designates that each municipality shall assess in the tax levy five (5) cents per capita estimated on the last census. This amount would be enough for the conduct of a fair board, with the fines and fees, but is hardly sufficient to accomplish all a board is able to do. This method has been accepted by the authorities of all the municipalities of the State, with one exception, Jersey City. Here public demand has been slow, and the politicians have not been led to see the imperative need of the course. The city has no appropriation, and exists on its fees and fines, which are unusually large. Far from me be it to impute wrong, but the inference is strong that this source of income would diminish if the legal assessment was made. Fines to be operative must be prohibitive, and fees should be discreetly large. In Jersey City the ordinary ordinance fee is in some instances but $10.

As a powerful aid in furthering the work of inspection, as well as interesting the public, is the voluntary sanitary organizations, such as this body and others in many towns where the public-spirited men and women band for the public weal.

The low grade to which party politics has fallen in this country, particularly in the towns, has so degraded the moral tone of the politician as well as many voters that the health board has been used as affording a place for friends, without regard to capability, as

a reward for helping the party. Every effort should be made to keep partisan politics from these boards. Non-partisan boards are to be preferred to bi-partisan ones, for the latter is but a misnomer and tends to perpetuate the fault. It is to be hoped that the act passed by the last Legislature will soon eradicate this defect.

The law of 1887 is a very satisfactory legislative act, being broad in application, definite in detail and accurate in legal phrasing. If the State board were not hampered by a deficient revenue its work could be profitably enlarged and its value much increased; further legislation increasing its power would enable it to approach and solve such problems as are now referred to special committees. The absurdity of more money being appropriated at times to investigate the diseases of swine or fowl than is given an important board for a year's maintenance does not meet with the approval of earnest sanitarians.

This law is as satisfactory and complete in dealing with the local boards as with the central one; but as the former have to depend in great measure on ordinances, a source of trouble soon arises because the local board has not the sole right to enact them. In Jersey City, for instance, besides the so-called health board, the board of aldermen, as well as the fire board, have the power to enact; and the spirit of each not being the same, ordinances are made which conflict. Again, penalties for non-observance of ordinances are ridiculously small and inefficient. A fine of $10 will not prohibit. To satisfactorily carry out the provisions of the law and enforce the ordinances, as well as to detect nuisances and dangers, a properly selected corps of specially trained men should be selected as inspectors. The special type will depend on the needs of each locality.

Though the immediate risk from the breathing of sewer gas has been overestimated in the recent past, yet it has been proven that the continued respiration of the same will lead to an anæmic state, which is a frequent forerunner of disease. This alone will suffice for the continuance of the plumbing inspector, but whether he should be an adjunct of the health board, and assess it, or be under the control of the building department is as yet undecided; as things are now, the former assumes the responsibility, and must see that the inspection is satisfactory. The number of inspectors should suffice for the needs of the town, so that hastily constructed buildings cannot escape investigation.

Sanitary inspectors have mainly to do with communicable diseases, but their work also extends to inspection of nuisances, particularly around tenements, their construction, surroundings, ventilation, lighting, etc. Not enough attention has been paid to this problem in our cities, and the housing of the poor has become a problem which is interesting many of the better classes. In some of the towns voluntary leagues have been formed to investigate them, and to incite interest. The last Legislature, by an act, authorized the Governor to appoint a committee to investigate the housing problem of the poor and to report to him with remarks. This committee has been in active existence during the past summer and will no doubt formulate an answer which

will materially assist in the application of present laws and ordinances, and, if necessary, suggest better ones.

Power to condemn, and even to raze, should be given the local boards, and the inspector will have his duties greatly lightened after a few greedy landlords have felt the law and lost at court.

The local boards should have full power to inspect all old buildings, as well as to dictate in the construction of new ones.

The statement that contagious diseases may be carried by the clothing of a non-participant is, I think, erroneous, and has been so proven; and to keep children living in a tenement, but not within the family afflicted, from school, is not good sanitation. Each child has a right to all the education it can procure, and in the light of modern knowledge it should not be denied.

The act of 1898 allows the State Board of Health to prohibit the sale of milk produced or stored where any of the infectious diseases prevail, to see that the sanitary arrangements of the stables are satisfactory, that the cows are fed with good food, the wells clean, and the water pure. This inspection service is in value second to none, and, though the law directs the State board to assume charge of this inspection, yet in our larger towns one should be constantly at hand at the delivery depots to test the milk before it reaches the consumer; the risk of disseminating disease is so positive and the temptation to adulterate, as well as to introduce preservatives of uncertain nutritional value, makes it devolve on the communities to keep up an active inspection service.

The statistics given below are very suggestive:

	Paterson.	*Newark.*	*Jersey City.*
Population,	105,000	255,000	225,000
Income—Appropriation,	$5,100	$65,000	0
Fees and fines,	1,800	5,161	12,084
Total,	$6,900	$70,161	$12,084
Members in board—All,	7	10	5
Physicians,	3	5	1*
Salary of health officers,	$1,200	$4,500	$1,200†
Clerks—Number,	1	3	1
Salaries,	$900	$4,000	$750
Plumbing inspectors—Number,	1	3	1
Salaries,	$1,500	$3,112	$1,000
Sanitary inspectors—Number,	1	22	5
Salaries,	$900	$17,605	$4,000
Milk inspectors—Number,	1	1	0
Salaries,	$600	$860	0
Market inspectors—Number,	1	2	0
Salaries,	$600	$2,000	0
Total salaries,	$5,700	$51,480	$7,310

* Seldom consulted.

† This salary is paid by the City Board of Police.

How nearly have we approached the ideal outlined? In the State board we have a number of excellent brains, scientific and diplomatic, and the sanitary inspection done under them is complete; but would the Passaic be in its present unsanitary condition if its legal powers were and had been sufficient? The local boards are indifferently organized, there being all extremes, from the complex Newark board to the many energetic but smaller township ones, with the political hybrid in Jersey City. In education much more can be done. Public sentiment must be aroused and the individual members made acquainted with sanitary matters and methods. The State board have issued 103 circulars, which, with the annual report, give considerable information. A larger appropriation and an increase in the number of inspectors trained in reporting as well as inspecting would put the product of the board on a par with the reports of the English and Massachusetts boards. We need educated men all along the line, from the Secretary of State board to the inspector in the remote township. We need a larger appropriation with greater responsibilities. We need last and first, in order to acquire the former, an informed and interested public.

Discussion of Dr. Dickinson's Paper.

By Dr. Henry Mitchell, of Asbury Park.

I think there is no risk of unduly magnifying the importance of the topic which Dr. Dickinson has presented. Good health laws have been enacted for local administration and the public is ready to receive skilled advice in regard to the protection of the public health, but the individuals who have thus far been depended upon to administer these laws have unfortunately had no preparation for their work. We cannot, in New Jersey, begin too soon to improve the local sanitary inspection service. The attention of the members of this Association has been drawn to the act which was passed by the Legislature of this year for the improvement of the inspection service, and it will be remembered that this act emanated from this Association. A committee was appointed last year to prepare a bill and endeavor to secure the passage of an act which should have for its purpose the improvement of the inspection service throughout the State by providing local boards of health with men who are fitted to enforce the laws and ordinances and to prevent the spread of communicable diseases. As a rule local boards of health are made up of the best citizens of the community, but it is a rare thing to find a member of such a board who possesses a knowledge of the work which the board is to perform, and almost all of the work is of necessity done by some officer who is under pay. The pur-

pose of the act referred to is to provide that in every sanitary district the inspectors who are to engage in this work are fitted for their duty. At present the sanitary authorities in many localities may have notice from a physician of the existence of a case of infectious disease and yet no action is taken to prevent its spread. In well-managed towns effectual action may be taken to prevent the spread of disease, but the infection may be brought into such towns from adjoining districts where no action is taken to prevent its spread. Therefore in towns where the sanitary administration is well conducted there is fully as much need for the proposed advance in the application of the ordinances and laws as there is in the districts where at present there is no sanitary organization. The act referred to goes into effect on January 1st, 1905, and it provides that after that date no sanitary inspector, including all employees of local boards of health except those engaged solely in clerical work, shall be appointed until he has been examined and has shown himself to be competent. The examining board has not yet been appointed, but it is probable that at the next meeting of the State Board of Health the members will be named. In this State there is at present no course of instruction open for those who desire to take this examination. Rutgers College offered examinations to voluntary applicants several years ago, and thereby placed New Jersey in the lead in the endeavor to improve the sanitary inspection service. Although I am not informed as to what Rutgers College will do in the future, it is to be hoped that a course of instruction will be established there. A course of reading will, however, probably be the principal reliance for the coming year for those who wish to take the examinations. It is safe to say this is the most important act for the protection of the public health which has been passed since the act to which Dr. Dickinson has referred, the act of 1887, under which local boards of health are organized. Dr. Dickinson has spoken of the State Laboratory of Hygiene, which was formerly located in Princeton and is now located in Trenton. The principal reason for changing the location of the laboratory was in order to have better mail service, and the service now reaches all parts of the State promptly. If a specimen of diseased tissue is sent from the patient in the forenoon a report goes out the next morning early, and the attending physician receives the desired information before he visits the patient. The service is giving much satisfaction to physicians and health officers.

Medical Inspection of Schools.

By William S. Disbrow, M.D., Newark, N. J.

The school-room is the field upon which many of the future battles of sanitation will be fought.

The subject of the Medical Inspection of Public Schools has become so common that it is with difficulty that we find material for further discussion. With your permission I will present a few remarks on various subjects with which we have had considerable trouble during the short time since its adoption in the schools of Newark.

The establishing of such inspection was not primarily a purely sanitary measure, but one in which two objects were to be obtained—the early recognition of contagious diseases, with the quarantine of pupils at home, and the additional appropriation received from the State School Funds for increased school attendance, secured through the expected improvement in the health of the scholars. It is necessary for me to place the educational authorities in this apparently unaltruistic position for the sake of discussion, for the reason that a large number of children are sent and detained at home at present which should be in the class-room, such as are not suffering from a contagious disease, but from some unpleasant or dangerous condition which affects themselves only.

They want every well child in school, and to do this the pupils must not be exposed to infection through the admission to the class of those with such diseases as may endanger the health of others. With the limited measures at our command we have done well, but the question arises, How shall we improve it from the point of view of the sanitarian and school authorities?

There is but a small number who should be removed at once—those suffering from contagious diseases or those in which class-work and surroundings are prejudicial to their personal well-being. The first class are well looked after, so we will not consider them further in this paper.

As a chain's strength is in its weakest link, so in our case the whole structure of medical school inspection rests upon the willingness and diagnostic ability of our school teachers. They are told "that they must remove from their classes any child who appears to be ailing or any one ill with a contagious or infectious disease at the time of the morning roll call."

It is manifestly impossible for her to do so even with the more than average intelligence which she possesses. She has more than enough now with arithmetic and clay modeling, sewing and grammar, carpenter work and reading, geology, botany, mastodon and pedagogy, and at

last physic. The teachers have been willing in the greater number of cases to do what they could, and they are to be complimented for their good work.

Some plan must be arranged by which the Inspector will not have to wait downstairs for the few cases of illness which, during the few minutes at the teacher's command, she has been able to capture. The solution of this matter is the personal inspection by the Medical Inspector in the class-room; if not daily, which seems impossible now, then weekly visits should be demanded for the perfection of our plans to secure a class-room free from those suffering from disease.

As an illustration, permit me to quote from one of our teachers. She states that after repeatedly sending children who she supposed were suffering from illness to the Medical Inspector, she was laughed at and told there was nothing the matter with them, until she was afraid to send again because of her fear of ridicule. She states further that now she only sends those who are beyond a doubt sick enough for the Medical Inspector. Here is a condition which, I think, is very common and one in which officials are in fault. Here we have a bad spot in our system, and we must do something for its eradication.

We have too few Medical Inspectors for the immense amount of work which is at hand. We wish that each school had its own Inspector whose whole time could be devoted to that school only. This, I think, is in accordance with the school laws of this State, and this was, perhaps, contemplated when such an article was embodied in the regulations for the guidance of the school authorities, Article XXIX, Section 233, New Jersey School Laws, revised 1902, which reads:

"Every Board of Education may employ a competent physician to be known as the Medical Inspector, fix his salary and define his duties, and the said Medical Inspector shall visit the schools in the district in which he shall be employed at stated times, to be determined by the Board of Education, and during such visits shall examine every pupil referred to him by a teacher.

"He shall, at least once during each school year, examine every pupil to learn whether any physical defect exists, and keep a record from year to year of the growth and development of such pupil, which record shall be the property of the Board of Education, and shall be delivered by said Medical Inspector to his successor in office.

"Said Inspector shall lecture before the teachers at such times as may be designated by the Board of Education, instructing them concerning the methods employed to detect the first signs of communicable disease and the recognized measures for the promotion of health and prevention of disease. The Board of Education may appoint more than one Medical Inspector."

The subject of vaccination of school children is one which has been brought to our attention very forcibly during the existence of our late epidemic, and surely we have had a chance to gain in experience. The school regulations are too lax, and are such that it is impossible for us to be certain of their successful vaccination, except as shown by a certificate, and even that has proven, time and time again, to be not

worth the paper it is written upon; at times it is a willful misrepresentation of the facts. Anyone can get a certificate somewhere, and our classes are filled with unvaccinated children.

I would suggest that the Medical Inspector be authorized to examine every child for the evidence of a sure take; every care be taken to secure such evidence, and that only his certificate be accepted as the pupil's credential for entrance to school. The fact of such child's admission to one school should be its warrant for entrance into other schools in the same city in place of the senseless and troublesome running about to secure a new certificate from the family physician. Repeated vaccination should be insisted upon, for the school-room is the place where small-pox is to be fought, and no sentiment should be permitted to interfere.

The few anti-vaccinationists should have no separate right which we should observe if they are to accept the benefits of the State in the education of their children. Let us secure laws to make them comply with such conditions as shall not jeopardize the health of others. If they will not vaccinate their children, why not keep them from school or vaccinate in the class-room ourselves? Unfortunately we have no law covering this question, but it will come, I hope, soon.

The lousy child is like the scriptural poor, "with us always," and it is a source of considerable dispute as to what to do with it. Retention from school is a bad feature of this class of cases, and a great loss of time to the scholars. I think that they should be permitted to go to school, but the guardian should be required to attend to their heads, and a special pamphlet should be provided, with full directions in various languages, for a simple method for the extermination of the disease. The Medical Examiner should make repeated examinations to secure this end, and if not cured then put the lousy ones together. Don't inform the parent in all cases that the child has pediculosis capitis; tell them the child is lousy; and that while there is room for the child in school, common decency demands that he should remain at home.

The tuberculous child should, under no circumstances, remain at school, not only through fear of infecting others, but for its own good. The class-room is not a health lift under the best of circumstances, but of positive detriment to the unfortunate. Education would be of small benefit under these conditions at the best. As we are shortly to cure our early tubercular patient there will have to be some provision for their education, and here I might ask the question, Why not school facilities for such in the State Consumptives' Home soon to be built? Happily they are rare with us; but even a few are of sufficient importance to need consideration.

Another troublesome condition is that of ozæna, more commonly, but less elegantly, known as the "rotten ear," a well recognized source of danger to its possessor and a positive preventive of mental concentration to the one who sits to the windward of that ear when in good working order. The patient should receive medical care at once, and

if by chance the unfortunate's parents have not smelled it out before, call their attention to it and explain its serious consequences. These children may be permitted school privileges, but put them away from others; they are to be pitied, not disgraced. The more simple cases of ear inflammation should not be excluded, but the information sent to their homes of its existence followed up by careful examination to see if attention has been paid to the case.

The parochial schools should, by some provision, be made to establish medical inspection the same as others. They are a constant source of trouble owing to their lack of sanitary care, and why their thousands should be permitted to scatter infection about is more than I can understand. The reason is not willful negligence as much as the scarcity of funds, and I think they would willingly adopt such measures if they could see their way clear to do so financially. Would it not be wise and a good business move to have some State, if not municipal, funds at their disposal for this purpose?

Some provision should be made for the examination of the great number who attend our evening schools. Here we do not have the children, and are relieved to a great extent of the close watch for contagious diseases, still they are a menace and should receive consideration.

The great difference of opinion as to the length of time in which infection is possible in whooping cough makes it difficult for us to determine just how long to exclude the pupil. This disease, with its fatal complications, should receive greater care than that ordinarily bestowed upon it. My opinion is that at least two months is none too much to demand.

Under our present rule diseases of the eyes are not taken into consideration. Of course such as trachoma should receive attention at once and debarred from the school-room. We hope in the near future to include the systematic examination of the eyes, but as yet are unable to do so.

The consideration of chorea, erysipelas, contagious skin diseases, and those with valvular heart disease, as well as others which might be named, should be considered from the study of the individual case. At times it would be advisable for them to remain at home, but in others the class-room would not necessarily endanger their own health or that of others.

The Medical Inspector has a good opportunity to call on his brain reserve, and if he mixes it well with good old-fashioned common sense, he will be a success to himself and to us, and our methods of medical inspection of schools will be well worth the time and money expended. Give us plenty of Inspectors; see that their work is not too scattered and that they do it; pay them well if they are worth it, and then the school-room will not be feared and its bad reputation as a disease incubator and purveyor will vanish.

Discussion on Dr. Disbrow's Paper.

By Dr. Joseph Tomlinson, of Bridgeton.

Dr. Disbrow has given a very practical paper upon a very important subject. In fact the subject of the medical inspection and supervision of public schools is a much more important subject and a much broader subject than appears at first sight; for it really involves, or should involve, the whole question of the physical condition of those who in a short time are to constitute the great bulk of the citizens of our country. And yet this subject, notwithstanding its importance, is a comparatively new one.

Massachusetts took the lead in this, as in so many other matters connected with the cause of education. The first medical inspection of schools was in Boston in 1894.

The law regulating the inspection of schools in this State was enacted in 1900. A striking feature of the law in this State is the fact that the whole matter rests with the boards of education instead of being under control of the boards of health. It is also to be noted that they are vested with very little authority in the matter and that the inspection is optional rather than compulsory. Dr. Disbrow speaks from experience, and therefore with authority. He has conclusively shown that many conditions and diseases exist, incidentally, in the public schools. These conditions threaten the health and in some cases the life of the individual, and perhaps the health as well as the life of those with whom he comes in contact. Sight and hearing are often in jeopardy, and visceral disorders as well as contagious diseases find many unwitting victims. I have no comment to make upon the detection or practical management of these conditions. This has been practically and thoroughly gone over. But there is another phase of the question to which I wish to refer with special emphasis. It is the physical conditions which we as physicians too frequently find not as incidental to the public school system, but caused by the present methods of education. I refer especially to the various neuroses and conditions of the cardio-vascular system caused by the strenuousness of school life. The multiplicity of studies, the strain of examinations, the false spirit of rivalry constantly fostered by both parent and teacher are adding every day to that vast army of neurasthenics which fill the sanitoriums scattered throughout our country. There is no physician in this audience and no parent who has had children to educate but will bear testimony to the evils arising from the cramming system in our schools and colleges. We seem to have given up the idea that the chief aim of education is mental discipline, and are making a vain attempt to know everything, forgetting that we as finite beings, with all the limitations of

humanity, are struggling with an infinite quantity when we make such an attempt, forgetting that all technical knowledge to be acquired by the child in after years depends far more upon the habit of mind and methods of thought brought about by proper discipline than upon memorized facts, forgetting that comparatively few of those who attend the schools and colleges are to be scholars in the real sense of that term; forgetting in fact that quality rather than quantity is the great desideratum. But the medical profession and some educators are awakening to this fact and are making a vigorous protest against it. At the last meeting of the American Medical Association a committee was appointed from the section on nervous diseases to report on this subject at the next meeting. A committee was also appointed by the Medical Society of New Jersey to take steps toward establishing a more complete system of school inspection in this State and effecting in this manner some needed reforms in our educational methods. President Ira Remsen, of Johns Hopkins University, in a recent address said: "The fundamental defect in our educational system at present is complexity. We expect too much from the scholar. There should be a limit to this complex system. The requirements have reached an unreasonable point." The medical supervision of schools should embrace this point, and a properly qualified physician should have a voice in making the school curriculum; for in the delicate adjustment of the scholars duties, so as to obtain the proper correlation between mind and body, the physical and psychical conditions must be understood as none but a broadly educated physician can understand them.

There is still another phase of this subject to which I would like to refer. It is the exclusion from the public schools, or at least their segregation if in the school, of the atypical child, the neurotic and the degenerate. All this would properly belong to a complete system of school inspection and is thoroughly practical, for the observation of nervous conditions and mental states properly belongs to the duties of the physician.

In this way the criminally inclined might in many instances be reformed before they had become a prey upon society, and normal children would not be contaminated by them. Something has been done along this line in Philadelphia. When the compulsory law was made effective in that city it was found, of course, that there were some pupils who were intellectually or morally unfit for association with other children. They either could not or would not learn. Special schools were erected for the care of these pupils. They were not treated as criminals, but as diseased persons requiring special treatment, and the school methods were varied to suit the case. After six years of trial I understand they have given entire satisfaction and more schools of the same kind are to be erected.

Another question of vast importance is the physical education of the pupils in public schools. This would benefit most and is an absolute need to some, and can only be properly done under careful medical supervision. The term physical education is used in this connection in

its broadest sense. It is meant to include everything in the way of applied physiology or hygiene, exercise, gymnastics and recreation which may be indicated in an individual case. All this can only be properly done under the direction of a properly qualified physician. Systematic physical training is the basis of successful manual as well as mental and moral training.

But how is all this to be accomplished?

1st. By persistent agitation of the subject and its frequent discussion in sanitary, medical and educational bodies.

2d. By a closer touch between educators and physicians and a more thorough understanding of the mutual relationship existing between physical and mental growth.

3d. By effecting such legislation as will bring about a general, compulsory and systematic medical supervision of public schools throughout this State and will place upon the State Board of Education a member of the medical profession.

4th. By the introduction into the public schools of a Department of Physical Instruction, which department shall be under the supervision of a properly qualified physician.

In what I have said in reference to the broader application of the medical supervision of schools I hope I have not seemed to detract in the least from what has already been demonstrated as a real and practical necessity. The importance of this cannot be questioned. The personal experience of the writer of the paper just read is proof enough of this.

Anyone who has had practical experience in this work in any of the larger cities will no doubt bear willing testimony to the conclusions of Dr. Disbrow. It is merely my desire to emphasize the importance and breadth of the subject under discussion and to refer to some of the phases of it which should receive more general recognition.

Though it may be impossible to attain all that may be desired, either by legislation or otherwise, every attempt to do so will have its good effect. The efforts for the betterment of sanitary conditions in this, as well as in every other field, will be doubly efficacious when made by such bodies as this, composed as it is of earnest workers, whose only aim is the betterment of mankind and whose only reward is the happy consciousness of duty done.

It is eminently fitting that the New Jersey Sanitary Association, devoted as it is to the physical welfare of all classes, should confer a lasting boon upon each rising generation by giving its hearty support and co-operation for the establishment of a more general and more complete system of school inspection in this State.

Discussion on Sewage Disposal in New Jersey.

By Rudolph Hering, C. E., of Montclair.

The object of sewage disposal should in all cases be to render harmless those bacteria which are contained in sewage and are associated with the causation of disease, and, further, to prevent offensiveness either on land or in water-courses. While sewage does not ordinarily contain more than one part in one thousand of organic matter capable of decomposing and producing putrefactive changes and nuisances, it is sometimes a difficult and expensive task to prevent this small amount of organic matter from decomposing so as to produce a strong putrid odor. The means of preventing such undesirable conditions, both as regards efficiency and cost, are affected to a very large degree by the local conditions surrounding every problem.

Sewage disposal may be accomplished either by dilution in relatively large bodies of water, or by intermittent filtration through sand, or by chemical precipitation of the suspended particles of the sewage, or by septic treatment. The two latter methods do not by themselves effect a complete purification, and are properly but a preparatory treatment, to be followed either by dilution, by intermittent filtration through sand, or by an intermittent flow through coarse material.

In New Jersey there exist in portions of the State large tracts of sandy soil that are highly adaptable for sewage disposal. Unfortunately such areas chiefly lie only in the southern half of the State, and not within reach of those large centers of population where sewage disposal is a more pressing matter. In the northern half of the State sewage disposal up to this time has been accomplished mainly by dilution, that is to say, by discharging the contents of the sewers into the nearest water-course. This means of sewage disposal, even from the standpoint of preventing nuisances, is rarely satisfactory or even permissible when the volume of stream-flow in the water-course into which the sewage is discharged is at any time less than three cubic feet per second for every 1,000 persons whose sewage enters the stream. There are times when, through the effect of millponds and slack water, it is necessary to dilute sewage to more than double this amount, or say seven cubic feet per second. Within this State there are several thickly populated sections where the capacity of the neighboring streams is therefore entirely insufficient to disperse and dilute satisfactorily the amount of sewage entering them. Better means must be considered for the prevention of nuisances of this nature. This demand applies, as is well

known, most particularly to the communities situated in the lower half of the Passaic Valley, and which now comprise the Passaic Valley Sewerage District.

With this, the leading problem of sewage disposal in New Jersey, kept in the foreground, but referring also to the other parts of the State, there may be summarized briefly for purposes of discussion the following available methods: 1, dilution by river water; 2, dispersion in deep sea water; 3, broad irrigation; 4, intermittent sand filtration; 5, chemical precipitation; 6, septic action; 7, contact beds; 8, continuous aeration on filters of coarse material.

Dilution by River Water.—This method, while still applicable to some communities, particularly those situated upon the largest rivers within and bordering the State, is not capable, either by natural or by artificial stream-flow, augmented through the aid of storage reservoirs, to serve the needs of the communities which are located on and near the lower portion of the Passaic river. The population contained in the cities of Paterson, Passaic, Aquackanonk, Franklin, Nutley, Montclair, Bloomfield, Newark, Orange, Harrison and Kearney aggregate about 650,000 persons, calling, according to the basis already stated, for a minimum stream-flow of about 2,000 cubic feet per second in order to prevent nuisances or conditions approaching thereto. It is more likely that a larger flow would be demanded, and, for a reasonable estimate of growth, I believe a provision for a flow of not less than 5,000 cubic feet per second would have to be made. This flow, on the ground of cost, would be prohibitive.

Dispersion in Deep Sea Water.—Three commissions have investigated the practicability of disposing of the sewage of the Passaic Valley, and each one has come to the conclusion that deep sea disposal is the cheapest and best method. From the Great Falls at Paterson to New York bay is approximately a distance of twenty-six and one-half miles. At the upper end of this district are the cities of Paterson and Passaic, and at the lower end is the city of Newark, while between these are two other large and several smaller cities. To dispose of the sewage of the Lower Passaic Valley into New York bay means that there should be constructed a trunk sewer, or intercepting sewer, which shall receive the sewage, freed, so far as practicable, from ground water and rain water, of the several communities situated along its length. It is practicable to obtain a gravity flow from the Great Falls in Paterson down to the Newark Meadows, below the city of Newark, excepting some small areas near Passaic. At Newark bay it is necessary to provide a pumping station, where the sewage would be first screened to remove the suspended matters of large size, and then pumped through force mains discharging into the topographic center of New York bay, at a point near the Robbins Reef Light, where the sewage would be quickly dispersed by the large volume of water in motion at that point. By carrying out this project there would be eliminated from the Passaic river all polluting matter of a seriously objectionable nature. The solid portions would be burned at the pumping station and the liquid

portions disposed of by dilution in a manner without nuisance to the residents around the bay. The cost of this project is estimated in round numbers at $9,000,000 when constructed on a scale to serve the needs of a population of 1,500,000 people.

In the case of a district where the most populous communities are situated at opposite ends, as in the case of Paterson and Newark, the question naturally arises as to whether it might not be cheaper to provide independent purification works for the several communities under consideration. A careful study of the possibilities in this direction by various engineers has shown that this was not the case, and that any other method of treatment would cost at least several million dollars more and probably be less satisfactory, and eventually require the removal of any such works that might now be built.

Broad Irrigation.—This method, which consists of applying sewage in small volumes to large areas of land of a more or less porous character, requires that sewage should be so distributed that the various crops raised upon the land will not be seriously injured. This, as is found in many cases in practice in Europe, is a serious matter, and it is a difficult proposition to take care of sewage following heavy rains and at times of harvesting without making the necessary rate of applying the sewage too great for a proper protection of the crops. Practice shows that it is necessary to provide at least one acre of land for each 5,000 gallons of sewage per day, equal, under European conditions, to about one acre for each 100 population tributary to the sewers and in our country for a still smaller population. For the Lower Passaic Valley, therefore, with a growth which seems reasonable to expect during the next thirty or forty years, there would be required an area of some 15,000 acres or more of suitable land, which, of course, is not available, to say nothing of the undesirable results which might follow the installation of such large purification works in the neighborhood of rapidly growing urban communities.

Intermittent Sand Filters.—In New England and a few other places, both in this country and in Europe, there exist glacial drift deposits of coarse sandy material which are admirably adapted to the purification of sewage by intermittent filtration. Where much sandy material is available, as near the seashore and in the southern part of the State, this method is the most efficient for the satisfactory purification of the objectionable organic contents of sewage. In the northern section of New Jersey, however, particularly in the vicinity of the lower Passaic river, no extensive porous sandy tracts are available. As it would be necessary to provide about one acre of sand at least four feet deep for each 1,000 to 1,500 population, the cost of this method, if the sand would have to be brought from a distance, generally would become prohibitive. There are sections in New Jersey, however, where there is less porous material, such for instance as found in the vicinity of Summit. Here the results become inferior to those from sand, although, with sufficiently large areas to reduce the quantity of sewage per acre, it is quite possible to accomplish an effective grade of purification.

Chemical Precipitation.—This method consists in the application to the sewage of some form of chemical, such as lime, iron or alum, to precipitate the solid matters in suspension and some organic matter in solution, resulting in its deposit on the bottom of tanks, through which at a fairly slow velocity the chemically treated sewage is allowed to flow. At best this process can remove only about one-half of the organic matter and in the vicinity of ninety per cent. of the suspended organic matter. It is an expensive process, due to the cost of the precipitating chemicals and the attendance and maintenance, and due particularly to the care of the resulting sludge or precipitated solid matter or sludge which from time to time must be removed and satisfactorily disposed of. This concentrated organic matter or sludge is the most objectionable feature of this process.

In some places, as at Providence, R. I., the method of precipitation, which was recommended for adoption some fifteen years ago, can apparently serve its purpose for some time to come, but at Worcester, Mass., it has been clearly demonstrated, and so decreed by court, that the chemical method of itself is not a sufficient purification because of insufficient subsequent dilution, and that further treatment is necessary. As a preparatory treatment, chemical precipitation may perhaps have some extended usefulness in the future, according to experience in a number of English cities, particularly at Salford, where the effluent from this type of treatment is filtered through materials of coarse nature.

Septic Process.—By this process sewage passes slowly through tanks, allowing subsidence of the heavy matters and bacterial decomposition of organic matter to take place. It requires the establishment of bacterial growths of a certain kind, which takes time for a proper development and necessitates the exclusion of oxygen. Septic tanks are of such a size that it takes from half a day to a day for the sewage to flow through them. This does not mean that the bacteria are capable within this short period of time of converting any considerable portion of the suspended organic matter into liquid or gaseous form. It rather means that the suspended particles, with a slow velocity, will subside and then encounter the bacterial processes. About one-third of the weight of suspended particles entering a septic tank flows out with the liquid leaving the tank; about one-third remains on the bottom as a mineral residue, and the remaining third is converted by bacteria from its solid form into a liquid or gaseous form. The frequent evolution of gases coming from the putrefying organic matter on the bottom of the tanks causes the formation ordinarily of a scum of considerable thickness. This scum is not made up of greasy floating matters, as is sometimes thought to be the case. It floats because particles which once have settled to the bottom rise to the top with entrained gas particles formed in the interior.

This process, though sometimes called a method of purification, is in reality simply a preparatory step to facilitate subsequent purification by other processes at a rapid rate. Its usefulness arises from the fact

that it reduces the area of a subsequent filtering surface, necessary for a treatment of raw sewage, and thereby reduces the total expense.

Contact Beds.—One of the mose interesting experiments made a dozen years ago or more, in the early days of the investigations made at the Lawrence Experiment Station of the Massachusetts State Board of Health, was the fact that a comparatively high degree of purification of sewage could be accomplished by applying it in small doses at frequent intervals to gravel stones of a size as large as a walnut. This process is now well understood to be the result of bacterial oxidation and nitrification in the presence of a suitable quantity of air. Largely as a result of the experiments made by Mr. Dibdin, General Chemist of the London County Councils, following the publication of the earlier experiments at Lawrence, there were instituted numerous plants in England and this country, which are composed of materials averaging upwards of an inch in diameter, upon which sewage, freed from the greater portion of its suspended matter, was allowed to flow until the voids or pores of the filtering material became full. After a bed so charged remains full of sewage for several hours the contents are allowed slowly to drain out, and air is allowed to circulate freely through the pores of the material for another period of several hours. There generally results a well nitrified effluent after this treatment, and one which, if the rate of filtration is not too great, will generally not putrefy even if it is not further diluted by the waters of a running stream into which it is discharged. It is not, however, a highly purified liquid, nor is the purification of a suitable degree to allow of the discharge of such an effluent into a stream soon to be used for drinking purposes.

With the ordinary sewage of American cities treated by the septic process, the rate of subsequent filtration can be permanently maintained as high as three-quarters of a million gallons per acre daily, provided the beds are some four or five feet in thickness. With shallower beds the rate is correspondingly less, and with thicker beds proportionately greater.

In some instances it is considered preferable to pass the sewage successively through a series of such contact beds, as is done in several places in Europe, with the result that, while the final effluent is not usually free from suspended matter, its organic contents are mineralized to a degree which assures the absence of putrefaction under all ordinary circumstances. The average rate of filtration in these beds abroad seldom exceeds one million gallons per acre per day.

Continuous Aeration on Filters of Coarse Material.—In places where porous sandy soil is not readily available at reasonable cost, and it is necessary to build filters of artificial construction, cinders, coke and other coarse materials are sometimes arranged in a manner similar to that required for the contact beds above mentioned, but in place of ultimately filling the pores of the bed and allowing them to drain, the liquid sewage, freed from suspended matters, is sprayed upon these beds in a way to facilitate thorough aeration of the liquid before it

reaches the filtering material and while it slowly percolates through the same. Where the devices for spraying the liquid are not seriously interfered with by freezing weather, such as would be the case in some places in the southern section of this country, this method seems to have much merit and for a given area of filtering surface would apparently produce a high degree of purification, as demonstrated at Lawrence. As compared with contact beds, if the degree of purification is constant, continuous aeration by spraying will allow filters to operate at a higher rate of speed than is the case with contact beds.

Discussion on Sewage Disposal.

By J. J. R. Croes, C. E., of New York City.

The plan proposed by the New Jersey State Sewerage Commission for the disposal of the sewage of one million five hundred thousand people in the populous district of the middle eastern portion of the State seems to be both economical and scientifically adapted to the end desired. It is proposed to convey all the sewage to a point in New York bay in the center of the tidal channel and discharge it at least forty feet below the surface. There are no exact precedents for this scheme. A portion of the sewage of Boston is discharged into tide-water well outside of the harbor, some of it at the surface and some of it thirty feet below the surface. The sewage of Dublin is discharged on the surface into Dublin harbor, an estuary of the River Liffey, in which there is a strong tidal current running outward on the ebb.

The purification of sewage is produced by oxidation of the offensive and disease-producing constituents of the sewage. This result seems to be attained by the segregation and diffusion of the offensive and pathogenic constituents so that they may be brought in contact with the air or with other matters which act upon them chemically, dissolving and transforming them, or by biologically devouring them, as it were. The method of purification by excessive dilution of the sewage-polluted water in a large volume of water of a different character appears, from all the data which we possess on the subject, to be the most effective means of bringing about the desired result. In the case of bacteria, it would seem as if the separation of bacteria of a harmful nature from close association with others of their own kind was effective in causing the death and destruction of those species which, when they are kept closely associated with others of their own kind, propagate and multiply rapidly. Separated from germs of their own class the pathogenic germs appear to have a definite period of life and to disappear entirely, just as do individuals of any other class of vital organism, animal or vegetable. The more rapidly an entire break-up of colonies and the segregation of individuals can be effected, the more rapidly the work of purification of a polluted liquid progresses. In the case of the discharge of sewage into sea water, the observations

which have been made with great care in the River Liffey indicate that the lateral dispersion of the sewage matter through the waters of the tidal current into which it is discharged is quite slow. This is not unnatural, as the specific gravity of the sewage is less than that of sea water and the tendency to spread laterally is but slight. The sewage tends to rise to the surface and overrun the heavier salt water. The deeper the point of discharge can be the more thoroughly will the diffusion and dispersion of the sewage pollution be. In the case of the New Jersey sewage, it is proposed to discharge it from forty to sixty feet below the surface of New York bay on the margin of a channel seventy feet deep, in which there is a large volume of water flowing seaward at all times and with varying degrees of velocity and varying specific gravities and chemical constituents; the fresh water flowing from the Hudson river tending always to the surface and the tidal wave retarding its passage on the rising tide, so that the deeper water is more salt and of greater specific gravity than the water near the surface. With the outgoing tide the seaward current is strong and the polluted sewage is exposed to its greatest force and will be carried seaward with probably only slight diffusion through the mass or over the surface until a sufficient time has elapsed for its entire disorganization, so to speak, and masses or colonies of pathogenic substances will not be found.

The discharge of the entire New Jersey sewage into this strong and large tidal current would be less liable to produce unwholesome conditions along the shores of New Jersey, New York and Staten Island than would the discharge of the same matter in Newark bay and the Kills. Such a method of disposal is very different from the discharge of sewage into the surface of land-locked bays fed largely by the surface waters from the adjacent uplands. From such bays sewage should be excluded entirely.

The preservation of the purity of the sources of water-supply for cities and towns is receiving at this time more intelligent attention than ever before. In Massachusetts the Metropolitan Water Board have instituted a system of thorough inspection of the whole territory through which streams contributing to the Boston water-supply flow, and strenuous efforts are made to prevent the entrance into these streams of drainage from privies and from barnyards without previous filtration through earth or other purification. During the past year a similar course has been taken by the New York City Department of Water-Supply, and a thorough inspection and supervision of the Croton watershed is now in progress, with the result that a great many sources of pollution have been entirely removed, and efforts are now being taken to insure as complete supervision of pollution entering the streams as is practicable. The New York State Health Commissioner is active in this direction also, and is making every endeavor to secure a thorough inspection and supervision of all sources of water-supply throughout the State. There is no more important work looking to the preservation of health and the prevention of disease than such supervision and control.

Discussion on Sewage Disposal in New Jersey.

By C. C. Vermeule, C. E., Jersey City.

While recent experience in the treatment and purification of sewage has thrown considerable light upon the subject, and has suggested practical methods, it may be admitted that there is still very much to learn. You will admit, for instance, that, although septic or bacterial processes are satisfactory for some sewage, results are not uniformly good for all kinds. We will admit that it is less trouble to the engineer to turn the crude sewage into tide-water than to purify it, but are we prepared to admit that science has done all that it is possible to do in advancing the state of the art? We have with us eminent engineers who will tell you that they can purify sewage-polluted water sufficiently to make it safe for drinking, and can do so at a reasonable cost. They will tell you of great progress made in this direction during the past twenty years. Are we, then, in the same breath, to admit that we cannot purify sewage to the moderate extent that will remove the foul emanations and unsightly substances which render our streams disgusting? Surely, we are not ready to admit that we are unequal to the task of finding a practical way of doing this. We cannot take the ground that the art can be no further advanced. But why are we not urging this wealthy State to be up and doing in this matter? With its vastly important sewerage problems pressing for solution, with every city, town and village groping for relief, what has New Jersey contributed to the art of sewage disposal during the past ten years? Nothing, absolutely nothing, and it is with shame that we are compelled to admit it. To-day, suffering as we are from the errors committed within our own generation, we, apparently without protest, continue to repeat these errors. With all our boasted progress and civilization, we are inaugurating still more expensive blunders than those of the past, for such I believe the emptying of crude sewage into tide-water will be found to be.

The practice of turning crude sewage into the nearest water-course has been extremely expensive to this State. The pollution of the Passaic, by compelling the abandonment of the Belleville Water Works, cost the city of Newark over $6,000,000, and Jersey City, from the same cause, has been compelled to spend nearly $400,000 yearly for the last six years for a temporary supply of pure water. New water-works now building will bring her total outlay to $11,000,000. The pollution of the Delaware compelled Camden to spend a large sum for a new water-supply. Many smaller places have suffered likewise. Property interests on large streams have been greatly injured, the growth of large cities retarded and some of our most attractive valleys have been turned into an abomination. Not to speak of the injury to health, $25,000,000 will not cover the money loss up to the present time.

Yet what is the remedy which is now offered to us? Simply a transfer of the evil to points farther down stream, to our tidal-waters. What is the reliance of the advocates of this course? Why, dilution, the same old dilution, the same mysterious power of self-purification which in the past was attributed to our running streams, and which is the cause of our present woe. Gentlemen, from personal observation and experience I tell you that no one can determine the actual dilution of sewage which will occur in tidal waters. When the tide ebbs and flows there is apparently a great run of water, but it is merely like a wave, and often there is very little actual displacement of water. Right nearby in Barnegat bay, although, as many of you know, there is a great rush of water into and out of the inlet at each tide, observations which I made last summer show that even below Seaside Park, or only one-third of the way from the inlet to the head of the bay, the water is only one-fourth sea water, while at Mantoloking and above it is absolutely fresh. The tide ebbs and flows twice daily, but the water is not changed. The Delaware ebbs and flows past Camden with a great rush, yet that did not prevent the appearance of solid substances of sewage in the bathtubs of Camden when that city drew its water-supply from the river. The pollution of the Delaware is increasing at a rapid rate. When the streams are low, that river opposite Philadelphia is now about one-fifth sewage. Slowly that filth, year by year, creeps farther down into the bay, to the peril of our great fish and oyster industries.

Last winter a bill was introduced appropriating the large sum of $9,000,000 for a trunk sewer to relieve the Passaic of its filth, but merely to transfer it for a time to New York harbor. Even the framers of the bill, although they drew it in such a manner as to compel the sewer to be built into the bay at great expense, evidently believed that at some time sewage purification might be necessary. This appears from the fact that in the bill they expressly reserved "the power to establish within said sewerage district, when necessary, sewage works and works for the treatment, disinfecting and disposal of sewage." Such works must be five miles from the outlet, and must therefore be located on the Newark Meadows. Strangest of all, the law says there must be but one such disposal works. The Newark men who drafted the bill appear to have been so captivated with the idea of a trunk sewer that they were even willing to concentrate the entire vile output of sewage and factory refuse from Paterson and Passaic at their own very doors for purification. One would naturally think that if the sewage of Paterson and Passaic is to be purified it should be done at some point as near as possible to those cities. There is certainly nothing peculiarly favorable about the Newark Meadows for such treatment. But if treatment and purification are necessary, why build a trunk sewer at vast expense into New York bay? Why not discharge the purified effluent into Newark bay instead? These are the questions which naturally occur to us, but again a strange thing happened. Although in the bill they made this preparation for trouble in case

they emptied the crude sewage into New York bay, when the peril of this course was pointed out before the Legislature, the framers of the bill at once championed it and openly claimed that no possible harm could result. The Legislature was unconvinced. Apparently it did not consider that the Commission had properly investigated this important question, so it executed the remarkable straddle of appropriating $9,000,000 to empty the crude sewage into New York bay, but stipulating that "before any moneys are expended the Board shall carefully investigate whether said discharge is likely to pollute the waters of said bay." Certainly, if such an investigation was necessary, it should have preceded any such appropriation. Compelled by the law to investigate, what did our Commission do next? Did they investigate the tidal currents, ascertain the volume of flow, trace the extent of the pollution about the wharves and docks of Brooklyn or Jersey City? Not at all. The so-called investigation, as appears by their report, consisted merely of opinions by an eminent military engineer, by an equally eminent engineer of docks and wharves, by an eminent engineer of transportation, and, finally, from an engineer who is a specialist in every branch of the profession. Not investigation, but argument, and the same old argument that has been at the root of our troubles for the last quarter century. Dilution, forsooth! "It will all go out through the Narrows," say these gentlemen. Well, if it does, what then? So did the garbage scows of a few years ago, and so do some of them still. But did the garbage go out on a European voyage? Did it not, on the contrary, hug the shores of Long Island and New Jersey, and will not the filthy sewage do the same?

Most of these gentlemen do a sum in arithmetic to back their opinions. By the rule of three they show the enormous dilution which will cure all evils. By the same token the sewage of a nearby coast resort is to the volume of the Atlantic ocean as an atom to infinity. That, I suppose, is the reason we suffer sore eyes and are disgusted by evidences of sewage when we bathe at certain points on our seashore. But let us also do a sum in arithmetic. Coast-survey observations show a net outflow through the Narrows of about 16,000,000,000 gallons of water in twenty-four hours. The proposed Passaic trunk sewer has a capacity to discharge 326,000,000 gallons daily. Of course, this sewer is built with the expectation that in the reasonably near future the sewage to be cared for will reach this quantity. Now, this sewer serves less than one-tenth of the entire population which is emptying its sewage into New York bay. When its capacity is reached, therefore, the total discharge of sewage into the bay will be 3,260,000,000 gallons in twenty-four hours; 3,260,000,000 of sewage against 16,000,000,000 of water. The sewage will be one-fifth of the whole, and the waters of New York bay and the Kill von Kull, the waters which flow out through the Narrows into Raritan bay and thence creep out along our seashores, will be as bad every day of the year as the Passaic is now at its worst. Observe that this will come so near in the future that

the Passaic Sewer Commission thinks it wise even now to build large enough to anticipate the event. The outlook, gentlemen, is not inviting.

I single out the Passaic sewer simply because it is the most prominent illustration of a dangerous tendency. It is evident on almost every page of the report that the expenditure of $9,000,000 called for in this work will simply bring in its train other large expenditures to render the work effective. All this is based upon tide-water disposal. It seems almost incredible that such incongruities should occur in legislation affecting a matter of such vital importance, that such a far-reaching policy should be adopted, although the Legislature itself was convinced that the investigation was incomplete when the bill was passed. But the same thing is going on elsewhere. The great sewer now building to provide for West Orange, South Orange, Millburn, Summit, Irvington and parts of Newark and Elizabeth discharges its crude sewage directly into Staten Island Sound, and is sure to seriously defile that narrow channel.

The great fish and oyster industry of our State is in jeopardy. It has already suffered serious loss. Only a few days since Mr. Baldwin found oysters from Raritan bay affected by factory waste. Raw oysters, once so popular, are already banished from thousands of tables. This industry in New Jersey and Long Island produces an annual product worth $7,000,000, about half of which is in oysters alone, and employs 20,155, persons. The menace of typhoid fever is cropping up all around it, and yet vast sums are being expended to empty crude sewage into our tidal waters.

Gentlemen of the Sanitary Association, these truths may be unpalatable, but they must be recognized to be remedied. I am criticising no individual, I am merely resisting a tendency. I would have this great State of ours strive for something better. The State of Maryland will not allow Baltimore to empty crude sewage into Chesapeake bay; Baltimore must find a way to purify. Even Cuba is in advance of us, for I have been compelled to purify the sewage of Cienfuegos before emptying it into the bay. Our State should at once make a serious effort to advance the art of sewage disposal. It should at once equip a laboratory, with competent engineers, chemists and bacteriologists, to conduct experiments on a working scale upon the very sewage with which we have to deal. It should build upon what has already been done by the Massachusetts Board of Health and others. Meanwhile, until we have found a civilized method of disposal, we must adopt makeshifts, but they should be as inexpensive as possible, and all permanent works should be designed to be adapted for ultimate purification of the sewage. Let us stop spending enormous sums to carry crude sewage afar into tidal waters under the delusion that this is final disposal. It is a mere makeshift, and let us recognize it as such.

Discussion on Sewage Disposal.

By J. Waldo Smith, C. E., of Paterson.

In looking over the field it appears that no efficient means for disposing of city waste has been found. As the population increases, and particularly in populous river valleys, the discharge of sewage into the river soon becomes objectionable to the residents lower down the river, and we must look in the near future for some other way of disposing of sewage. In fact in some instances this method is objectionable to the city itself disposing of its sewage. The time is surely right when something should be done for disposing of sewage in some other way, and stop this method of dumping on our neighbors that which we cannot or will not take care of on our own territory. The great State of Massachusetts has been foremost in studying methods of sewage purification and giving their results to the world, and to-day you see the reports of the State Board of Health referred to throughout the world. The State of New Jersey, I am glad to say, has passed acts looking to the purity of its streams of water, and this is a great step in advance. We have an application of this law in the Passaic Valley. This seems to be a step in the right direction, and it should be extended to larger areas in the community. The State has made these laws, and it seems to me it is absolutely imperative that other methods of dealing with this sewage matter must be found, and this State should undertake experiments for efficient means of disposing of sewage at its source, but so far, I think, no method other than disposal into large bodies of water has been very successful, probably because it has not been thought necessary. I want to say a word about the Passaic Valley below Paterson. This is a populous district. The sewage pollution, and particularly the pollution from mill-waste, is increasing at an alarming rate. Let us look for a minute at the method of dealing with this drainage, and I don't think that anyone will admit that the proper method has been found. I don't think communities in that valley will be brought into harmonious thought on this subject. It is a district of great importance on account of its factories, etc. It seems to me that this State should undertake to carry out this work, and should raise the money to carry out the work under three able commissioners. In doing this there would be a saving of cost of about twenty-five per cent., and the cost of the operation of the works should of course be assessed on the communities benefited. This I believe to be a perfectly practical way.

Discussion on Sewage Disposal.

By E. W. Harrison, C. E., of Jersey City.

Mr. President, and gentlemen of the Association, I did not expect to be called upon until an hour or two ago, and have not been able to prepare a special paper. I have been interested in the papers read to you on this subject, especially as I was one of the engineers, referred to in one paper, who reported upon the discharge of sewage into New York bay. On that subject there are one or two points that seem to be overlooked. First, that the volume of water passing out of the Narrows came back again; that is, the same water. Study has been made of the currents of New York bay, and it would seem that this is not the fact. The waters of the upper bay move down, and as soon as they reach a certain point below the Narrows they are driven back by the flood tide, not into the Narrows, but into that enormous expanse of Raritan bay. The volume of water in Raritan bay is much larger than that of the upper bay. About one-half of the tidal flow after it has mingled with the waters of the bay below goes back again through the Narrows. The gentleman also seemed to have the idea that the only remedial action taking place is the dilution by the waters of New York bay. Now, look into this matter and you will find that when the water of New York bay is at ebb tide, the time when the sewage of four million people passes down through the bay, you will not be able to find the sewage except by close chemical examination. Why is this? If anyone will go to the mouth of the larger sewers and take a sample of water within five feet of it, and examine the water microscopically, he will find a number of animal microorganisms devouring the solid particles in the sewage. It he should go one hundred feet further out he would find a larger number of microorganisms working. This action takes place provided you do not completely saturate the water with sewage and destroy all oxygen. The gentleman speaks about the enormous fish trade. What is it? It is a more important thing to me to know that the two great centers of population of New Jersey—Hudson and Essex counties—are able to sewer into tidal waters, and I believe that is the place to put their sewage. In one examination we took samples of water between Ellis Island and Governor's Island where the river currents join, and these samples required a close chemical examination to discover any trace of sewage in them. What has the State Board of Health of Massachusetts done but followed out this very plan and discharged their sewage into Massachusetts bay. The discharge of sewage into streams used for potable waters is, of course, dangerous and to be deprecated; you make such waters unfit for potable uses and a nuisance, as the Passaic river. That river has reached a

point where it is completely saturated with sewage. All animal microorganisms have been destroyed. It is very different in discharging into New York bay. If the volume of discharge does not reach a point where the animal microorganisms and fish are destroyed the remedial action of such marine life takes place. Another statement which I think is based on a wrong presumption is that the growth of New York City will increase at a greater ratio. The new growth of the city of New York will be beyond the Bronx, and the sewage therefrom is discharged into the sound. The population of the lower part of New York is not increasing. It is safer for the engineer to discharge his sewage into a tidal stream. The great trouble with filtration works and sewage-disposal plants in this country is their maintenance. There is no engineer in this room who can tell, when he has built and turns over a proper filtration or disposal plant to the board of aldermen or the council to take care of, that the people of that town will not be poisoned in six months. I doubt if any city in the State of New Jersey can manage a filtration plant and be sure of it. Politics are liable to put the wrong men in charge of such works.

Garbage Disposal: Recent Legislation in Relation Thereto.

By Edwin B. Goodell, of Montclair, N. J.

Since my paper on the above subject was read at the New Jersey Sanitary Association meeting in 1901 the following legislation has been enacted changing the powers of municipal corporations in respect to this subject:

In 1902 an amendment to the act of 1896 (Public Laws of 1896, p. 56) was passed restricting the exercise of the power of cities to make contracts for the collection and removal and disposal of garbage to the lowest responsible bidder therefor, after advertisement for bids. (Laws of 1902, Chap. 51, p. 200.) In other respects the powers of cities, as summed up in said paper (see page 4 of the pamphlet) remain unchanged.

The powers of incorporated towns and townships have been enlarged.

By an act passed in 1902 (Laws of 1902, Chap. 218, p. 671) the township committee of any township may, by ordinance, create within the limits of such township one or more "Garbage Districts," and may from time to time alter and define the boundaries thereof, and may provide, by contract or otherwise, for the collection and removal of garbage within any such district.

Section 3 and 4 of the act provide for raising funds to pay the expense of such removal by taxation of the taxable property within the district.

This act does not specify "disposal," but the power to "remove" undoubtedly would, by implication, confer the right to dispose of the

same by any method necessary to make its removal complete and effective for the purpose for which it was authorized.

This act, if constitutional, places townships in a favorable position in respect to this subject. Towns are also at this time invested with ample powers. By an act passed in 1903 (Public Laws of 1903, Chap. 45, p. 70) it is provided that, in addition to the powers now possessed by the town council under the act providing for the formation and government of towns, the council shall have power "by ordinance to provide for the collection, removal, treatment and disposal of ashes and garbage, and to appropriate and provide for raising money by taxation for said purposes or any or either of them."

No other legislation affecting the legal status of this work, passed since the last report, has come to my attention, nor have I observed any judicial decision which affects the general conclusions therein expressed.

Isolation of Infected Persons.

By George E. McLaughlin, M.D., of Jersey City.

The story of the "History of Quarantine"[1] is associated particularly with the epidemiology of leprosy, pest and syphilis, cholera and yellow fever being secondary considerations. We read of isolation being applied against leprosy in Biblical times; and Captain Cook tells us that at the time of his visit to the natives of the South Sea Islands it was their custom to take crude sanitary precautions toward arrivals from neighboring places. The Crusaders brought back with them to Europe, from the East, numerous diseases; and it was in connection with pest, and later syphilis, that maritime and land quarantines were established in medieval times. The term "pest" was very comprehensive at this time, and not only included bubonic plague, but different epidemic diseases. The Venetians were the first to make provision for maritime sanitation, and this past summer it was my pleasure to visit the island of San Lazzaro, in their harbor, where, in 1403, the first maritime quarantine station of which there is historical record was established.

Why We Isolate.—Isolation is conducted to protect the health and life of the well person, and conserve his usefulness to the community and to his own personal ends. Figured on a purely commercial basis, the loss to a city by the disabling of its citizens during an epidemic is usually great. Statistics show us that about 300,000 individuals die annually in the United States from preventable diseases.

What We Isolate.—Ostensibly, we isolate the individual; scientifically, we endeavor to isolate the causative agent of the disease. Communicable diseases are due to the transmission of pathogenic organ-

[1] "Early History of Quarantine" (Yellow Fever Institute Bulletin, No. 12), J. M. Eager, M.D.

isms from the body of a sick person to that of a second susceptible individual, this transmission being immediate, or through the body of an intermediate host. Experiments and clinical experiences have demonstrated beyond the shadow of a doubt that the pathogenic micro-organisms are possessed of a specific and individual activity; that is to say, that each micro-organism possessing pathogenic properties is capable of setting in motion a morbid train of symptoms belonging to one disease entity and no other. The number of communicable diseases which are dependent upon such a specific micro-parasite of either the animal or vegetable kingdom is already large, and is constantly being added to; as, for example, acute dysentery or the summer diarrhœas of children, which have been demonstrated in the past year to be due to the bacillus dysenteriæ. Nevertheless the fact is to be noted that even now, in spite of all modern scientific research, there are many diseases known without doubt to be communicable, in which the specific micro-organism has not been found. This is a stimulant to further research, but it is not a crippling to those who have to do with the management of such diseases; for we are justified in assuming that some micro-organism does exist for each of these cases, and in using such belief as a basis of a sound working hypothesis.

When to Isolate.—Isolation should necessarily begin when the disease becomes transmissible and end when the transmissibility ceases. Naturally a most important factor here to be considered is the diagnosis or identification of the illness in the individual. I say a most important factor advisedly, for the spread of many communicable diseases is largely accomplished by the unrecognized ambulant cases. That these very mild cases may occur in most communicable diseases is beyond dispute. You have all heard of "walking typhoid." The same condition is possible in Asiatic cholera, typhus fever, scarlet fever, small-pox, yellow fever, bubonic plague, diphtheria and some other diseases. Now, how shall we pick out such cases? By having competent, well-paid inspectors, who shall investigate every reported suspicious case and pass judgment. This I believe is an absolute necessity; for, as Dr. Doty[1] says, "Those who are not constantly dealing with infectious diseases usually expect to meet typical cases, and do not, as a rule, carefully consider the probable existence of mild or ambulant ones, which really constitute a greater menace to the public health than those well marked, inasmuch as they frequently are not recognized or looked for."

And here let me bring to your notice the great value of the clinical thermometer in picking out these mild cases. All persons who have been exposed to infection and whose mouth temperature, by a registered Hicks thermometer, is above 99.5 degrees F. should be looked upon as suspicious, and treated accordingly. I say 99.5 degrees because the temperature varies in certain individuals who are in good health.

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[1] "The Necessity for a More Careful Investigation as to the Cause of Outbreaks of Infectious Diseases" (Med. Record, Feb. 23d, 1901), A. H. Doty, M.D.

In a test made by Dr. Doty[8] on incoming steerage passengers, who were and had been in good health, 16,152 temperatures were taken, and these varied between 96 and 99.4 degrees F.; the majority, however, were between 98.4 and 98.6 degrees F. The test thus confirmed the belief that the normal bodily temperature is about 98.5 degrees F. I append the complete table of these mouth temperatures:

582 were between 96 and 97 degrees F.; 1,124 between 97 and 98 degrees F.; 2,108 were 98 degrees F.; 779, 98.2 degrees F.; 7,340, between 98.4 and 98.6 degrees F.; 2,432, 99 degrees F.; 976, 99.2 degrees F.; 811, 99.4 degrees F.

It has been suggested that, inasmuch as it is difficult or impossible to diagnose some diseases in their earliest stages, as, for example, small-pox, diphtheria or scarlet fever, and as no quarantine is usually adopted until some diagnosis is made, it would be wise to institute the so-called preliminary quarantine in cases where there is a reasonable suspicion of a communicable disease. Cards that would read, "QUARANTINE; PROBABLY INFECTIOUS DISEASE HERE," could be used temporarily in such cases.

List of communicable diseases, with periods of incubation and infectiousness:

Small-pox.—Incubation, 12 days; initial symptoms, eruption, 14 days; isolation, 6 weeks.

Measles.—Incubation, 14 days; isolation, 4 weeks.

Scarlet Fever.—Incubation, 1 to 6 days; isolation, 6 weeks.

Whooping Cough.—Incubation, 7 to 10 days; isolation, 8 weeks from commencement of the cough, and should then mingle with others only if the whooping and spasmodic cough have ceased.

Influenza or Grippe.—Incubation, 2 to 3 days; isolation, 10 days at least.

Diphtheria.—Incubation, 2 to 7 days; isolation, 6 weeks, but dependent upon disappearance of all local lesions and bacilli from nose and throat.

Plague.—Incubation, 3 to 6 days; isolation, until all expectoration, diarrhœa or other discharge has ceased.

Typhus Fever.—Incubation, 8 to 12 days; isolation, 3 weeks.

Typhoid Fever.—Incubation, 8 to 14 days; isolation, 4 to 8 weeks, or until disappearance of bacilli from urine and stools.

Asiatic Cholera.—Incubation, 2 to 5 days; isolation, 2 to 3 weeks, or until stools assume a healthy appearance with disappearance of the bacilli.

Acute Dysentery or the Summer Diarrhœas of Children.—Incubation, about 1 week; isolation, in rooms protected from flies by screens and netting over the beds, and away from patients suffering from other diseases, until stools return to normal condition.

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[8] "The Use of the Clinical Thermometer as an Aid in Quarantine Inspection" (Med. Record, November 1st, 1902), A. H. Doty, M.D.

Yellow Fever.—Incubation, 2 to 5 days; isolation, in mosquito-proof room until apparent return to health, with disappearance of albumen from the urine.

Malaria.—Incubation, about 2 to 21 days; isolation, in mosquito-proof room until disappearance of the plasmodium from the blood.

In closing this topic I would say in general that it is unsafe to regard too closely any number of days or weeks as indicating the time when a patient suffering from an infectious disease should be discharged from isolation. In the exanthematous diseases the patient is ready for removal when the desquamation or scaling is entirely over, and not before.

Disinfection and Disinfectants.—For disinfection and disinfectants I can do no better than to refer to Past Assistant Surgeon Rosenau's excellent book on this subject.[4] He says. "With the advance of our knowledge of disease, and especially that disease germs are frequently conveyed from the sick to the well by the agency of other animals, disinfection has come to include the destruction of vermin and insect pests. In disinfecting for yellow fever, malaria and filariasis, we must destroy the mosquitoes that convey the infection. In disinfecting for cholera, typhoid fever and other disease we must pay attention to the flies and other winged insects which have been in contact with the infected discharges. In the disinfection for plague we must destroy the infected rats, mice and fleas." Now, a word as to the carrying of infection in clothing. Few beliefs have a stronger hold on the laity and many of the medical profession than that clothing worn by *well* persons is a usual means of infection, whereas careful investigation shows that this occurs only in very rare instances. I grant you that this theory is a seductive one, as it furnishes an excuse for not carrying out a rigid investigation to ascertain the true origin of the outbreak.

In conclusion, I wish to make a plea for a laboratory of hygiene for each of our municipal health boards. In the last decade such laboratories have advanced to a position of prime importance; and it is impossible without their aid to do sanitary work which is first-class. "Practice alone brings us into a groove from which there is no outlet; but practice combined with scientific research guarantees progress in public health."[5]

Huxley has said, "Science is nothing but trained and organized common sense." So let us endeavor to master the science as we make use of the discoveries which have been made for the prevention of disease, in which the science of bacteriology has played so great and important a part.

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[4] "Disinfection and Disinfectants" (1903), J. Rosenau, M.D.
[5] "Harben Lectures" (London, 1903), Ferdinand Hueppe. M.D.

The Mosquito Parasite.

PROF. JOHN B. SMITH, Sc.D., OF NEW BRUNSWICK.

Dr. Stiles told me some time ago in reply to a question that he knew very little about this mosquito parasite *Agamomermis culicis* other than that I sent it to him and he described it. As I know nothing except what Dr. Stiles has told me, the depth of my ignorance on the subject is apparent. In other words, though we have learned something about the creature, the matter is in no real shape for presentation to a body like this. One point has attracted my attention at this meeting: most of those who have spoken have mentioned the mosquito and in a way altogether different from previous references. It seems to be recognized generally, not only as a factor to be dealt with, but as a proper subject for sanitary attention.

A year ago I spoke hopefully of what I thought might be accomplished. Since that meeting investigations have been carried on in many parts of the State, and, instead of a few poorly known species, New Jersey now enjoys the distinction of having a longer list than any other State in the Union, a distinction that will not be hers when some others are searched with equal thoroughness. Thirty-three species have been taken, and thirty-one of them have been actually bred; that is distinct progress. And we have investigated not only the mosquitoes, but their habits, where they live, their breeding places, their manner of breeding and their relation to man, whether as carriers of disease or as nuisances. The species belonging to the genus *Anopheles* are the only known carriers of the malarial parasite, and of this we have three species: one confined to the southern end of the State, the others scattered everywhere. Only one of them has been actually proved a malaria carrier; the others may be so, but have not been convicted.

We have investigated the swamps and marshes in the Hackensack and Passaic Valleys, the salt meadows from the Passaic to Long Branch and from Point Pleasant to Cape May, omitting only the few unsettled stretches. We have carried on some work on the Delaware bay and along the Delaware river, and we have made numerous local surveys for interested communities. In some places the surveys have been intended only to get a general idea of the character of the breeding places; in others the investigation has been thorough, to locate all dangerous areas. Last year I spoke tentatively from personal conviction; now I can say positively that there is nothing in the way of practical mosquito extermination in the State of New Jersey; not from belief alone, but because I can prove it and because the experiments already made show how it can be done. The city of Newark, through its Board of Health and in co-operation with my office, did something like 40,000 feet of ditching at the cost of one cent per running foot.

The ditches are six inches wide, two feet deep and drain perfectly, making one of the worst breeding areas near Newark absolutely safe—not for a season, but permanently. There are other equally bad places, but the supply has been reduced by several millions, and, as we have a complete survey of the entire meadow area, we know exactly what remains to be done. So the meadows at the mouth of the Raritan river have been surveyed and a complete system of ditches has been mapped out. The mosquitoes that breed on these marshes fly, under favorable conditions, not only as far as New Brunswick, but cover all the territory to Metuchen, extending to a greater or less degree to Bound Brook, Dunellen and Plainfield, affecting altogether a population of over 50,000 people. To remedy matters less than 400,000 feet of ditching is needed, and, making due allowance for extras, I have no hesitation in saying that less than $5,000 would be required to wipe out this bad breeding area entirely. To support this estimate I have the maps and surveys at hand. So far as Newark and Elizabeth are concerned, less than $10,000 will clear out their entire marsh breeding areas, from the Passaic to the Elizabeth river.

I have wandered somewhat from my assigned topic, the mosquito parasite. Like all animals, the mosquito has its parasites and other natural enemies. Were it not so they would drive out the human population altogether. In 1902, when Dr. H. W. Johnson was studying mosquitoes for me, he ran across a few little intestinal worms in Anopheles larvæ. The facts are recorded in my report for that year, but no importance was attributed to the matter. During the same season I found worms while dissecting the abdomens of some adults. Now whenever I see a worm I think of Dr. Stiles, and therefore sent him the two specimens. He did not know anything about them; but I felt sure that sooner or later he would take them up, and he did. I have now two bottles here, prepared to show these worms for this season we found them in great abundance. One of my investigators found that forty per cent. of one of the broods developing at Cape May were infested, and in collections made along the coast I found great numbers until the mouth of the Raritan river was reached. Here they were very scarce, and on the Newark meadows none of the mosquitoes showed any trace of the parasite, though many hundreds were dissected to bring out this point definitely. Why this should be so I do not know, but the fact is positive.

Only females have been found infested, and these are not hindered either in flight or from feeding. But they are prevented from reproducing their kind, for the ovaries in a wormy mosquito never develop, the parasite requiring the contents of the entire body cavity. The practical value of this parasite remains to be fixed. When we learn how it multiplies, how it may be introduced into new localities and how it may be artificially propagated we will be in position to speak more definitely.

Laboratory Investigations for the Protection of the Public Health.

[ABSTRACT.]

BY R. B. FITZ-RANDOLPH, A. C., F. R. M. S., DIRECTOR OF THE LABORATORY OF HYGIENE OF THE STATE OF NEW JERSEY.

Within the past few years the number of laboratories maintained by State Boards of Health has greatly increased. Many of the Eastern States, especially those in New England, and some of the Western ones now possess well-equipped laboratories engaged in investigations, the ultimate object of which is the conservation of public health. * * *

In this State the Laboratory of Hygiene was established at Princeton in 1896, and was conducted as a laboratory for the examination of specimens from suspected cases of communicable diseases until 1902, when a portion of the work on foods and drugs was performed there until the laboratory was removed to Trenton in the latter part of 1902. For many years examinations of foods and drugs had been made by certain chemists appointed by the board, and for several years a laboratory, under the direct supervision of the Dairy Commissioner, was maintained in the State House. The two laboratories were finally consolidated under one head in February, 1903.

Under the law, the laboratory may properly make investigations regarding all matters relating to the public health, the adulteration of foods and drugs, the purity of public water-supplies, and, in certain cases, of private water-supplies. No authority is given to make any investigations of a private nature. * * * In this laboratory we limit ourselves to investigations having some important bearing on the public health, and further confine ourselves to such of these in which the liability of error is not too great and which can be performed without an excessive expenditure of time. * * *

The routine work of the bacteriological department consists in the examination for diagnosis of specimens from suspected cases of diphtheria, tuberculosis, typhoid fever and certain other communicable diseases and the bacteriological analysis of water. A system has been established whereby physicians can easily collect and send specimens to the laboratory and receive reports of the results of the examinations within a short time. The laboratory provides mailing cases constructed in accordance with the provisions of U. S. Postal Order No. 176, which are distributed to repositories located in towns and cities throughout the State and can be obtained from them or from the laboratory on request. Most of these repositories are located in drug stores, as it has been found that they are the most convenient points of distribution available. There are now 277 of these repositories in the State, and the number is continually increasing.

Specimens mailed by physicians in the morning will almost always reach the laboratory on the same day; if mailed after one or two o'clock they will usually be received on the following morning. * * * Specimens arriving in Trenton before 7:30 P. M. are examined the next morning, with the exception of Sundays and holidays, when only specimens from cases of suspected diphtheria receive attention.

In the diagnosis of diphtheria the chief requirement next to accuracy is speed. To make the diagnostic service of value it is necessary that a report of the result of the examination shall reach the physician at the earliest possible moment. * * * In order to be certain that the bacillus of diphtheria is absent from a specimen it must be grown on serum for at least twelve hours at body temperature. This necessitates an over-night incubation of most of our specimens. In many cases, however, the bacillus, if present, will grow sufficiently to be easily demonstrated only in four or five hours. Specimens arriving at the laboratory before twelve o'clock are therefore immediately planted and are examined at five o'clock. Our experience has been that in about half the cases the diphtheria bacillus can be found after five-hour incubation if present. Those in which the bacillus is not found are incubated over night and examined on the following morning. The direct examination of swabs has not proven satisfactory in our hands, probably because they are completely dry when received. The regular morning examination of diphtheria specimens is completed and the reports mailed by 8:30 A. M., and, with the exception of a few points in the extreme northern and southern portions of the State, the physician receives his report the same day. When reports are sent by telegraph, a procedure always to be recommended, they usually reach the physician before 10 A. M. * * * Specimens other than those from suspected cases of diphtheria are not examined on Sundays and holidays, it being believed that the necessity for haste in these cases is not sufficient to require it, entailing, as it would, a considerable hardship on the already overworked members of the laboratory staff. * * *

In tuberculosis an early diagnosis is of great value, but is usually impossible for the physician to make without laboratory assistance, nor are laboratory results, when negative, of much value. * * * Such results, therefore, should never be relied upon to establish the absence of the disease, but in suspicious cases specimens should be sent to the laboratory at short intervals until the bacilli are found or the patient recovers. A demonstration of the bacillus in sputum is satisfactory evidence that the patient is suffering from the disease.

A positive result from a specimen of blood from a suspected case of typhoid fever, if properly examined, is almost certain evidence that the patient is suffering from or has in the past experienced an invasion by the bacillus typhosus. A negative result has comparatively little significance. Negative results from specimens taken before the fifth or sixth day of the disease have no significance at all. Atypical reactions, that is, reactions which show either a tendency toward agglutination or loss of motility or both, but are not complete in either respect within

a period of time suited to the dilution employed, mean nothing; subsequent reactions may be either positive or negative.

The examination of specimens for the parasite of malaria offers peculiar difficulties in routine work, * * * and therefore a negative result in the case of malaria is of little or no value. A positive result is conclusive evidence that the patient is suffering from the disease. Of the other communicable diseases from which specimens are examined it is unnecessary to go into detail, with the exception of rabies. This examination in most cases requires the inoculation of animals and a lapse of from six to twenty days before they develop the characteristic symptoms and die of the disease. * * * Physicians and veterinarians would usually save much valuable time and get fully as accurate results by confining the animal supposed to be mad and carefully watching it. After a dog has developed marked symptoms of rabies its death is only a question of a few days and the symptoms are characteristic enough for diagnosis. * * *

The investigation of foods is limited to a few substances which are constantly found to be adulterated. The most important of these are spices, flavoring extracts, molasses, honey, maple syrup and cider vinegar. The examination of the quality of the milk and water supplied to our citizens is of the highest importance from a sanitary standpoint. These two foods are the only ones the use of which is universal. Milk is extensively adulterated and the adulterants are frequently of a filthy or dangerous character. The production of milk in this country is usually carried on under conditions which are anything but sanitary and in many cases positively dangerous to health, and we have no good laboratory methods for detecting the most dangerous adulterants, those derived from unhealthy cows, filthy surroundings or polluted water. We can, however, detect and prevent gross adulteration. At present our examinations are confined to the determination of total solids and the performance of tests for the detection of preservatives and coloring matter. The law governing the sale of milk is defective in that it prescribes no minimum for its fat content. Inasmuch as the fat is usually regarded as the most valuable constituent of milk and is certainly the most variable and easily tampered with, it is highly desirable that a minimum amount be required by law. The use of preservatives for the prevention of souring in milk is a reprehensible and quite indefensible practice. It is well established that milk properly drawn from healthy cows, if kept in a suitable environment and properly cared for, can be kept sweet, even in the hottest weather, for much longer than is necessary for it to reach the consumer. The use of any preservative, therefore, is good presumptive evidence that something is wrong with the milk or with the care it receives. * * * The only preservative found during the year was formaldehyde, this substance being so cheap, efficient and easy of application that it has almost entirely superseded the other materials formerly used for this purpose. * * *

The addition of water to milk is, unfortunately, still a common practice, principally because it is possible for a skilled man to add a considerable amount to average milk without risk of detection or punishment. If the water is good little harm results; but if, as is often the case, the water is taken from a well reeking with pollution, this form of adulteration may become the most dangerous with which we have to deal. During the past year fifty-four analyses of samples of water from wells located on dairy premises were made, and the results, in a measure anticipated, showed that the majority of these wells were seriously polluted. In over sixty per cent. of the cases examined chemical analysis showed unmistakable evidence of a considerable amount of pollution, and in almost all cases in which a bacteriological examination was made (this was not regularly done until the middle of the year) the colon bacillus was found in large numbers, indicating that the pollution was recent and partially, at least, of fæcal origin. Such wells as these would in all probability become infected with the typhoid bacillus or the specific causative agents of other water-borne communicable diseases should opportunity present itself. As water from these wells is used for washing cans and other utensils, some of it inevitably finds its way into the milk. That the transmission of disease in this way is not merely theory the many epidemics directly traceable to infected milk-supplies will clearly prove. * * *

It is hardly necessary to dwell upon the importance of periodic examination of our sources of public water-supply. The brilliant results which have followed this work in Massachusetts and the fact that it is being done in many States is proof of its usefulness. We have hardly made a beginning as yet with this work, as, when properly done, it is decidedly time-consuming, and heretofore the laboratory staff have been too busy with other work to give it the attention it deserves. We hope, however, in the coming year to begin in a systematic fashion and ultimately make periodical analyses of every important public source of water-supply in the State.

Report of Committee on Animal Diseases and Animal Food.

(Abstract.)

By Wm. Herbert Lowe, D. V. S., *Chairman.*

Mr. President and Gentlemen—The Chairman of your Committee had the honor two years ago of reading a paper before the Association entitled "Progress in Veterinary Medicine in its Relation to Public Health." After the presentation and discussion of the paper the Association, in view of the importance of the subject, decided to establish a Committee on Animal Diseases and Animal Food, which committee now makes its report, although of necessity it must be somewhat pre-

liminary. Anything commensurate with the importance of the subject is quite out of the question at the present time.

At the outset we must recognize the fact that our subject is largely an agricultural or veterinary problem; and that the control of communicable diseases and the production of sound and wholesome food products is essential to the health, comfort and life of civilized man, for any community without a wholesome meat and milk supply is in an unfortunate predicament. * * *

The examination of milk, meat and other animal products has too long been left in the hands of laymen and others who have had no special education or training in veterinary and sanitary science. Meat and milk inspectors should be qualified veterinarians, and not butchers and laymen who know little if anything about the science whose province is to study animal diseases and animal food. Milk inspection should begin with the animal, and not with the product, as is commonly practiced. The interests of the producer have to be considered as well as the interests of the consumer. * * *

According to the Bureau of Animal Industry Report from the Census of 1900 there are in the State of New Jersey 165,000 milch cows; 74,000 other cattle; 74,000 horses; 48,000 mules; 175,000 swine, and 41,000 sheep. The value of these animals in round numbers is $16,000,000.00. It is an investment of such importance from a financial point of view alone that it is deserving of consideration and attention of the State authorities. Then there is the money value of the milk and other animal products, sent largely to the cities of New York and Philadelphia, to be considered. The public health side of the question cannot be estimated in dollars and cents, but in the health and lives of the population. * * *

There is no question but that New Jersey is more exposed to danger from communicable animal diseases than most other States. The quarantine station of the United States government, at which nine-tenths of the animals imported into the United States, which are liable to bring in contagious diseases, are quarantined, is located at Athenia, near Paterson, in this State. This station being inland, there is danger of dissemination of disease along the railroad in case of animals being infected. There is the danger of attendants carrying the contagion out of the quarantine station. Then the State of New Jersey, because of its proximity to the port of New York, where a large number of ships land at the docks on the Jersey side of the river, is peculiarly exposed to contagion from articles of merchandise like hides, wool, hair, etc. Enormous quantities of hides, wool, hair and other animal products are continually being shipped to the contiguous States and carted from railroad stations to mills and factories, and such shipments are continually going through our State. Cases of anthrax are liable to occur in tanneries and in woolen mills among operatives who have to handle these products. Anthrax is a disease that has to be taken care of when it develops, and the soil must not be allowed to become infected. An alluvial soil is peculiarly adapted to the

propagation of anthrax, where the germs can multiply, and in New Jersey the weather conditions are such as to bring these germs to the surface. In the summer time there are liable to be outbreaks of the disease among the domestic animals, not only threatening the animals, but the general health of the people. A serious outbreak of anthrax occurred in South Jersey last summer, which was promptly brought under control by the State Board of Health. The recent outbreak of mouth and foot disease in the New England States is an illustration of the danger to which New Jersey is constantly exposed. There is just as much, if not more, reason to expect an outbreak of foot and mouth disease at any time in New Jersey as there was in Massachusetts.

Another disease, which is liable to be introduced in New Jersey at any time, is a venereal disease of horses which exists in some of the Western States. It has been designated *maladie du coit*, or disease of coition. Rabies is a disease that is prevalent in certain parts of New Jersey and one that requires active measures to exterminate. It has been prevalent during the past year in my city—Paterson. A number of individuals have been bitten, and one boy died not long since, notwithstanding the fact that he had received the Pasteur treatment. I will not detain you now to even mention the diseases that are communicable from animal to man beyond saying that the State Board of Health is, by strenuous efforts, restricting and suppressing the dreadful ravages of glanders in the large cities in the northern part of our State. The Commission on Tuberculosis in Animals is doing a good work in exterminating infection in dairies and in the inspection and testing of dairy cattle shipped into New Jersey.

Report on Civic Sanitary Societies.

To the New Jersey Sanitary Association:

GENTLEMEN—Your Committee on Civic Sanitary Societies beg to report as follows:

Men are prone to think of the times in which they live as most startling times, especially on the lines along which they happen themselves to be interested. This is true of civic organizations. It seems as though the State of New Jersey were undergoing a peculiar civic awakening. This year has crystallized a number of questions, such as that of sewage disposal as brought prominently before the people by a joint sewer already under way and a trunk sewer soon to be under way; in general the problem of sanitary adjustment of matters in the Passaic Valley; such again as the question of mosquito extermination, which, thanks to the arduous and persistent efforts of the State Entomologist, is taking tangible shape.

Less prominently before the public is the work of civic sanitary societies and branches of civic organizations concerning themselves

with questions of sanitary interest in various localities. Several of these organizations have done good sanitary work, among them the Village Improvement Society of South Orange, the Civic Association of Nutley, the Town Improvement Association of Montclair, the Civics Club of the Oranges, the Town Improvement Society of Summit, N. J., the Orange Political Study Club and others. These are civic societies giving some attention to sanitation, but not confining themselves entirely to that question, as does the Civic Sanitation Association of Orange. The activity of these various organizations runs along definite lines which may be of interest to this meeting. For instance, the Orange Political Study Club found that the sanitary arrangements of the town prison in West Orange were entirely unsatisfactory. Conditions prevailed which were altogether too objectionable to be allowed to continue. Prisoners, men and women, were confined in such ways as to violate every idea of sanitation. The agitation begun by the club, backed by other civic organizations and by the Town Council of West Orange, has resulted in not only an amelioration of that condition, but also in the proposition to build a city hall which shall have a lock-up, which will correct these bad conditions. The Town Improvement Society of Summit, N. J., to quote another instance, lodged a serious complaint with the Civic Sanitation Association of Orange in reference to a certain tenement in that town. This, backed by the work of the woman health inspector in Orange, was very largely instrumental in concentrating civic effort upon the movement which resulted in a tenement-house commission. This commission had been visiting various large cities in the northern section of the State and has been investigating tenement-house conditions in the various towns. The other organizations have been instrumental in improving sanitary conditions in their own towns to a noticeable extent, taking up such questions as the disposal of garbage, the covering of carts used for such work, the proper location of dumping grounds, the incineration of garbage, disposal of waste paper, the sanitary condition of trolley cars, especially in bad weather, the ways and means adopted for disinfecting rooms and dwellings where contagious and infectious diseases have occurred, etc., etc.

As an illustration of the work done definitely along these lines by an organization formed for that purpose, we refer to some of the results obtained by the Civic Sanitation Association of the Oranges. After examining the work done by Mrs. Van Wagener in Yonkers anl elsewhere it was decided to engage the services of a woman health inspector, and to give to her an opportunity of carrying forward the work. It was argued that when the bread-winner or husband is away, as he is among the working classes in almost all instances all day, the male sanitary inspector finds the woman alone at home, and does not meet with the reception which will make his work most efficient; that there are many conditions of which a woman will not talk to him freely, but she will take freely to a woman. A woman can discover many things which would not be revealed to a man. Basing our action upon

this ground and upon the instructions such a woman can convey to women in the less cultured walks of life, in reference to the best way of attending to their household duties, the best way of keeping the sink clean, the best way of finding out when the sanitary arrangements are out of order, the best way of telling when the baby has a serious sickness, all these things involving largely the work of the friendly visitor and of the visiting nurse, we have obtained in the Oranges very satisfactory results. Our inspector has not aroused the antipathy of the people in any way; in fact she is welcomed and her visits are appreciated. An incalculable amount of good work, which shows no trace directly, has been done in this way. Miss Thompson, our first inspector, did an enormous amount of work in classifying and systematizing, in preparing cards which should bear the records of her visits, and in inaugurating the work at large. Miss Wilson, her successor, has continued her work in a very satisfactory way. The results obtained are as follows:

We set out in the first place to secure sewer connections for all the houses on five of the main streets of Orange; almost all of these connections it has obtained, and this we consider a very decided step forward. Many cesspools and vaults, the existence of some of which no one knew, the original builders being dead and forgotten, were discovered and filled up. In co-operation with the health authorities and with the Bureau of Associated Charities, the inspector found it possible to remove a family or two from houses that were no longer habitable. She also found it possible to do good work with cases of tuberculosis. She also took steps toward the more serious work of cleaning up the so-called brooks about the Oranges, which are virtually open sewers, and thus start a mitigation of the conditions existing in what is called the east branch of the Rahway river, one of the larger tasks still before our association. Study and investigation of the various ordinances or laws controlling the sanitary affairs in a city like Orange revealed the fact that newer conditions have arisen which make sections and sometimes an entire ordinance of no value whatever. The association has therefore looked up the possibilities of having ordinances drawn to cover such things as the condemnation of buildings unfit for habitation, and the proper regulations for thorough disinfection.

This gives some idea of the work done by an association formed directly for the purpose of co-operating with other civic organizations and with the boards of health in a bunch of villages called the Oranges. We add an abstract from one of the last reports of our association, which briefly outlines the work done by Miss Wilson during a period of about three months, and which will give an idea of how the work has been carried forward and its results:

"Objects: 1. To organize and mould popular sentiment in favor of wise legislation; 2. To assist boards of health in the discharge of their duties; 3. To encourage sanitary authorities by supporting them in difficulties; the creation of public opinion to sustain sanitary authori-

ties; 4. To assist in the education of the poor on sanitary questions by oral instruction and printed matter; 5. The publication of facts gleaned from official sources.

"What has been accomplished this season: A. A thorough house-to-house inspection has been inaugurated; during the three months that Miss Genevieve Wilson has been inspector for the Civic Sanitation Association, one hundred and fifty-two tenements have been inspected and fifty-five nuisances have been reported to the proper authorities; of the fifty-five cases so reported nineteen of said nuisances have been abolished; B. Seven cases of tuberculosis have been reported and visited by the inspector; C. Through the efforts of the association, the Delaware and Lackawanna Railroad has placed waste-paper cans at all railroad stations, not only in the Oranges, but in the neighboring towns throughout the division; D. The association placed several rubbish cans in convenient public places through Orange; E. We have been instrumental in having a large number of sewer connections.

"Work in which we are still engaged: A. We are endeavoring to devise a system by which the streets may be kept clean, and are making efforts to reach the council committee; B. To locate cases of tuberculosis, with a view to controlling and limiting the disease, and to continue the work of sewer connections besides the regular work.

"What we contemplate taking up in the near future: A. We will attempt the cleaning of the east branch of the Rahway river and to convert the brooks which are now open sewers into closed sewers; B. We will co-operate with the State Civic Federation in its efforts to establish the best means for water-supply for the various municipalities and to further all legislative measures helping toward better sanitary conditions of the State; C. To anticipate and guard against the tenement-house evil in the larger communities, especially in Jersey City and Newark, in co-operation with the State Sanitary Association and the State Board of Health; D. We shall make further efforts for the creation of bodies similar to the Civic Sanitation Association in other municipalities."

All of which is respectfully submitted.

ADOLPH ROEDER, *Chairman*,
H. BREWSTER WILLIS,
SPENCER MILLER,
Committee on Civic Sanitary Societies.

Members of the Association.

Allenhurst—J. M. Ralston.

Arlington—James A. Exton, M.D., John W. Griffin, John V. Laddey, D.V.S.

Asbury Park—T. Frank Appleby, T. H. Berringer, D. C. Bowen, Henry Mitchell, M.D., B. H. Obert, Randolph Ross.

Atlantic City—A. W. Bailey, M.D., Edward Guion, M.D., Elwood S. Johnson, A. M. Jordan, C.E., Joseph E. Lingerman, Walter J. McDevitt, G. Bolton Parsons, M.D., Walter Reynolds, M.D., Milton L. Somers, M.D., J. S. Westcott.

Bayonne—Fred. M. Corwin, M.D.

Bernardsville—L. E. Tuttle, M.D.

Beverly—J. J. Currie, M.D.

Bloomfield—Seymour P. Gilbert, T. Howell Johnson.

Bordentown—D. R. Brown, Samuel E. Burr, W. H. Shipps, M.D.

Boston, Mass.—F. Herbert Snow, C.E.

Bound Brook—H. M. Herbert, C.E.

Bridgeton—Henry W. Elmer, M.D.

Burlington—Shippen Wallace, Ph.D.

Caldwell—Morris B. Lindsley.

Camden—H. H. Davis, M.D., W. A. Davis, M.D., Joel W. Fithian, M.D., Henry B. Francis, E. L. B. Godfrey, M.D, W. I. Kelchner, M.D., John F. Leavitt, M.D., R. H. Reeves, Daniel Strock, M.D., H. Genet Taylor, M.D.

Demarest—William E. Davies.

East Orange—Vernon L. Davey, Ph.D., Thomas N. Gray, M.D., George P. Olcott, C.E., W. H. Van Winkle.

Elizabeth—Judge E. S. Atwater, A. D. Mulford, Louis J. Richards, Norton L. Wilson, M.D.

Hoboken—Thomas H. McCann, C.E.

Imlaystown—F. C. Price, M.D.

Jersey City—Gordon K. Dickinson, M.D., E. W. Harrison, C.E., George E. McLoughlin, M.D., Ferdinand Sauer, M.D., Henry Spence, M.D., C. C. Vermeule, C.E.

Kearny—Samuel Worthington.

Lakewood—Capt. A. M. Bradshaw, V. M. Disbrow, M.D., J. H. Hance, M.D., William J. Harrison, George W. MacMillan, M.D., D. C. Noble, M.D., W. G. Schauffler, M.D.

Metuchen—A. Clark Hunt, M.D.

Millburn—David E. English, M.D.

Millville—John W. Wade, M.D.

Montclair—M. N. Baker, C.E., R. P. Francis, M.D., Edwin B. Goodell, Rudolph Hering, C.E., James Owen, C.E., Horatio N. Parker.

Morristown—J. E. Taylor.

Mt. Holly—R. H. Parsons, M.D.

Newark—Herbert B. Baldwin, Ph.D., Chas. D. Bennett, M.D., David D. Chandler, Laban Dennis, M.D., W. S. Disbrow, M.D., James L. Hayes, H. C. H. Herold, M.D., Addison B. Poland, Ph.D., Morris R. Sherrerd, C.E., Harrison Van Duyne, C.E.

New Brunswick—David C. English, M.D., William S. Meyers, Cullen W. Parmelee, Hon. J. H. Van Cleef, H. Brewster Willis.

New York City—C. W. Hunt, C.E., F. C. Poucher.

Old Bridge—Asbury Fountain.

Orange—Thomas W. Harvey, M.D., Rev. Adolph Roeder.

Passaic—A. Ward Van Riper, M.D., Colin R. Wise, C.E.

Paterson—Philander A. Harris, M.D., W. B. Johnson, M.D., John L. Leal, M.D., John C. McCoy, M.D., William K. Newton, M.D., J. Waldo Smith, C.E., Isaac Van Houten, Franklin Van Winkle, C.E.

Plainfield—Charles J. Fisk, Andrew J. Gavett, C.E., B. V. D. Hedges, M.D., Rev. W. E. Honeyman, William H. Murray, M.D., J. B. Probasco, M.D., Norman H. Probasco, M.D., L. R. Thurlow.

Princeton—Prof. C. F. Brackett, M.D., LL.D., Col. Albert T. Woodhull, M.D.

Riverton—Alex. Marcy, Jr., M.D.

Rutherford—Samuel E. Armstrong, M.D.

Short Hills—Stewart Hartshorn.

South Orange—John B. Duncklee, C.E., Spencer Miller.

Spring Lake—Elwood H. Newman.

Summit—B. S. H. Baker, C.E., John E. Rowe, Jr., D.V.S.

Titusville—A. W. Hartwell.

Trenton—William Elmer, M.D., James M. Green, Ph.D., R. B. Fitz Randolph, A.C., F.R.M.S., Judge W. M. Lanning, John C. Smock, Ph.D.

Verona—H. D. McCormick, M.D.

Westfield—J. B. Harrison, M.D., R. R. Sinclair, M.D.

Woodbury—Warner Underwood.

Williamstown—Luther M. Halsey, M.D.

PROCEEDINGS

OF THE

Thirtieth Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, December 9th and 10th

1904

AT THE

Laurel House, Lakewood, N. J.

Officers and Committees, 1901-2.

President, ... [illegible], M. D., [illegible]
First Vice-President, ... [illegible]
Second Vice-President, ... [illegible], M.D., [illegible]
Third Vice-President, ... [illegible]
Secretary, ... James A. Exton, M.D., Arlington.
Treasurer, ... [illegible], C.E., East Orange.
Chairman Executive Council, ... [illegible], M.D., Lakewood.

Executive Council,

The above officers and—

[illegible]

Honorary Members of Council—The ex-Presidents: [illegible]

Committees.

[illegible]

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1905

CONTENTS.

Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers and other citizens of our State, interested in Sanitation as related to our homes, our schools and our municipalities. Any citizen may become a member of the State Association on application to the Secretary or any member of the Executive Council, on the day of meeting. The membership fee is two dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of the methods relating to the prevention of sickness and the promotion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise and preventing harmful sanitary legislation, and also to aid the State and Local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health, a part of the annual meeting is devoted to such special subjects as relate to the work of Local Boards of Health. Every Local Board should have present at the annual meetings its assessor, physician, inspector, or some other active member. The information secured for the benefit of each locality more than compensates for the expense.

MINUTES

OF THE

Thirtieth Annual Meeting of the New Jersey Sanitary Association,

December 9th and 10th, 1904.

OFFICERS, 1903-1904.

President, ...M. N. Baker, C.E.. Upper Montclair.
First Vice-President, ...Norton L. Wilson, M.D., Elizabeth.
Second Vice-President, ...Elias J. Marsh, M.D., Paterson.
Third Vice-President, ...H. M. Herbert, C.E., Bound Brook.
Treasurer, ...George P. Olcott, C.E., East Orange.
Secretary, ...James A. Exton, M.D., Arlington.
Chairman Standing Committee, ...Henry B. Francis, Camden.

FIRST SESSION.

The Thirtieth Annual Meeting of the New Jersey Sanitary Association was called to order by the Chairman of the Executive Council, Mr. Henry B. Francis, of Camden, in the assembly-room of the Laurel House, Lakewood, N. J., at 4:20 P. M., Friday, December 9th, 1904.

Mr. Francis—This is the Thirtieth Annual Meeting of this Association, whose meetings, and papers read before the same, are in the interest of sanitary science in its various branches, to devise means for the prevention of disease, and to educate the public, and place within their power the means to prevent the spread of contagious and infectious diseases. The Association has among its members physicians, civil and mechanical engineers, lawyers, and other members of health and school boards, who place before the public their views as to the proper application of the science of sanitation along their several lines. Ladies and gentlemen, I hope you will be interested in the papers which

are to be read here, and assist the Sanitary Association of New Jersey to educate the public and make the State of New Jersey the healthiest in the Union. I welcome you in behalf of the Association to this meeting.

The President, M. N. Baker, C. E., of Upper Montclair, then took the chair and said: The first subject on the program is malaria. There will be four papers on the subject, the first of which is entitled, "Prevalence and Fatality of Malarial Affections in New Jersey," by Dr. D. E. English, of Milburn, N. J. (For paper by Dr. English see subsequent pages.)

THE PRESIDENT—The next paper in the group is "The Etiology of Malaria," by Dr. J. T. Wyckoff, of Leonia, N. J. (For paper by Dr. Wyckoff see subsequent pages.)

THE PRESIDENT—The next paper is on "Laboratory Diagnosis of Malaria," by Dr. George McLaughlin, of Jersey City, N. J. (For paper by Dr. McLaughlin see subsequent pages.)

THE PRESIDENT—The last paper of this group is "The Prevention of Malaria," by Dr. S. E. Armstrong, of Rutherford, N. J. (For paper by Dr. Armstrong see subsequent pages.)

THE PRESIDFNT—This subject is one of the most important ones that we have before us on our program, and it is very desirable to have a good discussion of it. I am sure we would all be very much pleased if Prof. Smith would open the discussion.

PROF. JOHN B. SMITH—I have been a great deal interested in what has been said by those present. I came here rather to learn than to impart information, still one or two points have occurred to me. In the first place, there is no reason why a hilly country should not have malaria as well as those which are lower. I have found a number of anopheles mosquitoes together in one place at the top of Schooley's Mountain, Morris county. A pool was absolutely crowded with them. The anopheles is the only species we know that carries the infection. I think I can explain something of the reason why Middlesex county should have a larger percentage than some other sections. We have near the mouth of the Raritan river a large number of brick yards. In the operation of brick making, excava-

tions are made in order to get clay. This makes ponds, and after rains they fill up and make excellent breeding places for the anopheles. In Atlantic county there is a large number of breeding places, but we feel mostly the species punctipennis and crucians, and so far as malaria is concerned, we have information of only one species which carries it. The plasmodium that carries malaria is incapable of living outside of the blood of human beings or the mosquito. It has never been found in stagnant water. Persons have tried to cultivate this organism outside of the human or mosquito body, but have had no success whatever. One other point that touches on the last paper read in regard to the method of prevention. The anopheles mosquito hibernates only in the adult condition and only in females, and while they hibernate they have no food, so that in spring the anopheles have not fed and yet they are ready to produce their kind and they must find in the human being some condition which permits them to do this. Medicine has done a great deal to kill off organisms in the blood, and it helps largely to exterminate the disease. If all anopheles that are affected by malarial parasites could be so treated that every organism in the blood would be completely destroyed, and none left over in that section, malaria would be exterminated. Cases of malaria, when reported, should be so thoroughly treated that no traces of the organism could be found in the blood.

The President—We would be glad to hear from any others.

Gen. Alfred A. Woodhull—Possibly the decrease of reported cases of malaria in this State is due in a certain degree to the improvement in medical science, as represented by the younger men of the profession. I am strongly inclined to believe that diagnoses are more accurately made than they were eighteen years ago. Medical education is rapidly increasing the accuracy of diagnosis, and "malaria" is less frequently used as a cloak for misapprehension. In relation to the question of whether malaria may be taken in drinking water, I have no facts to which I can refer positively, but for a long time it has been my personal opinion that malaria may be acquired in that way, although I know perfectly well that this is not a scientific statement to make. In the irrigated portions of Southern California, malarial diseases have been quite prevalent among the whites and

not among the Chinese. The explanation has been made that the yellow race is not as susceptible to malarial disease as white races, overlooking the fact that the Chinese never drink raw water but always boil it, usually taking it in the form of tea. But if it is true that malarial disease may be taken up through drinking water, then it is very possible that in this case the germ is destroyed by boiling the water. We are told that the human body and mosquitoes are both necessary features in the production of malaria, and we know that in certain tropical regions there are horrible places in which a man cannot stay over night without contracting disease by the bite of mosquitoes; but there are also virgin swamps in which a man has never been, at least not in a long period, and yet if you go there you would get malaria.

PROF. SMITH—A word in explanation in regard to the California incident. As soon as the irrigation ditches are built there is always a residue of water, and that condition produces an abundance of mosquitos. That will account for the occurrence of malaria as existing there.

GEN. WOODHULL—We know very well we can take the poison of the rattlesnake in the stomach and it will not be absorbed, but the poison of the cobra, of India, when swallowed, may be absorbed. It seems possible that the plasmodium of malaria may in some way be absorbed through the stomach without being digested and thus enter the blood.

DR. ALEX. MARCY—In regard to the question of the very marked reduction in the death rate from malarial diseases, which would imply a very marked reduction in the number of cases of malarial diseases, might it not be that the almost universal use of quinine may have something to do with that matter? Some time ago, while on the shore of Maryland talking with some of the inhabitants, they told me that in years past every family in that section would have chills and fever in summer. At this time, while they occasionally have a malarial disease, they are rid of the chills and fever. As an explanation of that fact it has been suggested that the more universal use of quinine may have had something to do with the decrease of cases. If it is a fact that it is absolutely necessary for the malaria parasite to be carried over in the human being, and if it is possible to rid the systems of human beings of the malarial parasite if we continue to treat these cases until we are absolutely sure that

the blood is free of the parasite, it ought to be a very simple matter to get rid of malarial diseases.

Dr. W. G. SCHAUFFLER—I would like to ask Dr. McLaughlin if there is anything that makes it impractical for an ordinary practitioner of medicine to make diagnosis himself in cases of malaria. We hear so much said about laboratory work being beyond an ordinary practitioner's ability to do. Personally I do not believe it is. I believe all practitioners can make these diagnoses themselves, and I would like to ask if the finer points cannot be made out by the ordinary practitioner.

Dr. McLAUGHLIN—I see no reason why the general practitioner should not make diagnoses. The great essential is to have a thin smear. If you get a thick smear you will not get a good stain.

Dr. HEDGES—How would you account for the large number of mosquitoes in Alaska with the thermometer from 30 to 40 degrees below zero? I have been told by travelers that they have been almost devoured by mosquitoes in Alaska.

PROF. SMITH—It is not necessary that there should be stagnant water. I can take anyone to the swamps when they are covered with snow and ice, and can get mosquitoes out of solid ice in chunks. There are holes in the bogs and peat in Alaska which come to the surface of the ground, and in these holes mosquito larvæ develop in countless numbers.

Dr. D. C. ENGLISH—In regard to the fact that it is necessary that the system should be in a certain condition to contract malaria, it is possible that some people are in a condition in which they can overcome the plasmodium of malaria, but I think these people are very rare. I think there are few people that can escape if inoculated.

Dr. H. H. DAVIS—The Doctor, in his paper, has spoken in regard to the water coming from Camden. In the early springtime, before the mosquito has apparently made his appearance, or in the late fall, if I had a call to see a patient in a certain section, I knew the conditions and could prescribe at the office without going to see the patient. In the southern section of our city, in the spring and fall, we have old-fashioned chills and fever. Everybody seems to be affected at those seasons of the year. As soon as the place

was properly sewered, malaria began to lessen. The doctor speaks of the improved water-supply, but I don't know if that has been the only cause of eliminating or lessening malarial diseases.

Dr. S. E. ARMSTRONG—I would like to hear from Dr. Dickinson on the subject.

Dr. G. K. DICKINSON—I think the fatality from malaria is decreasing in proportion to the education of the younger men, and their ability to make proper diagnoses. I am not inclined to call a thing malaria until it is proved by laboratory methods. The death rate will fall in proportion to education.

Dr. T. N. GRAY—I would only like to say that the older physicians of the State are giving this subject careful attention and are keeping up with the younger men of the profession, though they may sometimes seem to be a little slower in reaching conclusions.

THE PRESIDENT—The report of the Publication Committee will be made by the chairman, Dr. D. C. English, of New Brunswick.

Dr. ENGLISH—We take care of the transactions of the Association to see that they are properly printed, and any other business which you see fit to assign to us. Last year the transactions were printed and distributed at a little later period than usual, because we had serious difficulty in securing the early return of proof sent to speakers and writers. This year we propose, if possible, to have the transactions printed earlier. In making the report, I would say that the proceedings are going to cost us a little more than usual because of the increased cost of labor and materials. Permit me in presenting this report to say that it is at considerable sacrifice of personal interests I am with you this afternoon and that it is with the deepest regret I shall be compelled to return home this evening. I always experience great pleasure and profit at the meetings of this Association.

THE PRESIDENT—I am sure we all appreciate the efforts the Doctor has made to be here in person to present his report. The next will be the report of the Committee on the Improvement of the Sanitary Service. and it will be made by the chairman, Dr. John L. Leal, of Paterson.

Dr. LEAL—This committee was appointed for a specific purpose, and that purpose was accomplished two years ago

by the passage of a law under which the State Board of Health examined health officers and sanitary inspectors. During the session of the Legislature last winter the committee also helped Jersey City to pass the bill which enabled them to establish a board of health for that city. As the committee's work is done, I would suggest that they be discharged, and make that as a motion. This motion was carried.

Dr. D. C. English—Before going to the next report might I add a word? It has been suggested that instead of publishing an annual volume of our proceedings that we endeavor to obtain space, if possible, in the new Journal of the Medical Society of New Jersey, to print the proceedings of our State Sanitary Association. This is a matter for the Association to consider. In the Journal space is somewhat limited, but if the change is desirable an arrangement can probably be made with the publication committee of the State Medical Society to publish the transactions of this Association in their Journal. It is suggested that the transactions would be printed earlier. I am not sure of the advisability of the change; there are some objections to it, but it should be carefully considered. I therefore move that it be referred to the Executive Council with power. This motion was carried.

The President—There is one other committee to report and that is the Committee on "Civic Sanitary Societies," of which Rev. Adolph Roeder is chairman. (For abstract of report by this committee, see subsequent pages.)

The report of the Treasurer, George P. Olcott, C. E., was then read. (For this report see subsequent pages.)

The President—I believe it is customary to refer the Treasurer's report to an Auditing Committee, and that it is usual for the chair to appoint that committee. I will appoint Mr. Owen and Dr. Leal to serve as the Auditing Committee and report later. There will be a meeting of the Executive Council at the close of this session.

A motion to adjourn was then carried.

EVENING SESSION.

The evening session was called to order by the President at 8:40.

THE PRESIDENT—We will be led in prayer by the Rev. C. P. Butler, of Lakewood, N. J.

THE VICE-PRESIDENT—We will now listen to the President's address on "Municipal Sanitation in Great Britain." (For this address see subsequent pages.)

THE PRESIDENT—Our first paper is on "Oysters and Clams as Vehicles for the Transmission of Typhoid Fever," by Dr. Edward Guion, of Atlantic City, N. J. (For paper by Dr. Guion see subsequent pages.)

THE PRESIDENT—The paper which we have just listened to is so closely related to the next one on the program, and the program is so crowded for the evening, that unless there is objection I would suggest that the papers be discussed together. The next paper, "Is there any Hygienic Objection to the Proposed Discharge of the Sewage of the Passaic Valley into New York Bay?" will be by Edlow W. Harrison, C. E., of Jersey City, N. J. (For paper by Mr. Harrison see subsequent pages.)

GEORGE A. SOPER, Ph. D.—As my name follows that of Mr. Harrison on the printed program, in the discussion of this topic, I wish to say that I have made no preparation for the discussion. There was a misunderstanding between your Secretary and myself or my name would not have been put on the program. As some of the gentlemen present may know, I am one of a commission, appointed by the Governor of New York State, to inquire into the pollution of the waters of New York bay. That commission was appointed nearly two years ago, and has been doing active work ever since. Our commission has not yet made its report to the Governor of New York State, and so it seems to me an act of impropriety that I should have anything to say in regard to the matter at this time. Apparently the discussion will be one-sided, but I would suggest that inasmuch as New York State has no representative here, that the whole assembly constitute itself the natural guardian of the State, and discuss Mr. Harrison's paper as I think he desires to have it discussed.

The President—This paper and the preceding one will now be open for discussion, and it is to be hoped that there will be full and free discussion. Every person who is interested in the subject is invited to take part. Of course it will be understood that if Dr. Soper finds it consistent with his sense of propriety to speak upon either of these papers, we will be glad to hear him.

Dr. Soper—There is a word I would be pleased to say in respect to the first paper, the question of the danger of oysters. I don't believe that boards of health have a more serious problem before them in the suppression of typhoid fever than in the direction of control in securing the purity of shell fish offered for sale. We have within the borders of many of our cities thousands of bushels of oysters and clams harvested yearly. I think if we should be willing to look the facts in the face we will be compelled to acknowledge that a very large part of all the shell fish that are consumed hereabouts are polluted. It seems a rather striking or radical statement to make, but in making it I think that we ought to remember that pollution and infection are often two separate things. It is possible to eat polluted oysters for a long while without becoming ill. We see oysters freshened in polluted estuaries, and we know that each oyster does not produce a case of typhoid fever by any means. It takes an unusual condition of affairs to produce typhoid infection. Our oysters are freshened or grown in polluted water, and the danger that they may be infected is constant. Two interesting cases that came to my notice are in substance these: Two little children had not eaten oysters or clams, but had played with the shells. At first sight it would not seem likely that they could become infected from oyster shells, but let me suggest that an oyster shell is dangerous whenever a little child plays with it and afterwards eats bread and butter or candy without washing the hands. The oyster, unlike the clam, lies on one side, and whatever pollution settles in the water settles on its shell, so now I examine not only the inside but the outside of shells. I would call to your attention this point also, that there is great danger in the methods of opening oysters. Whatever is on the outside is liable to get inside. A man stands at a table and opens the shells with a knife, throws the shell back in the barrel and takes the oyster and dips it in a tub or pail of water. Those who are sceptical as to typhoid, I would invite to inspect some of those tubs or pails.

HERBERT B. BALDWIN, Ph. D.—I would like to relate an incident of some interest in regard to the oyster absorbing other material beside bacilli. A little over a year ago I had occasion to investigate some oysters which had caused sickness in several families. The oysters were of an unusual greenish color, and the evidence was unmistakable that they had caused sickness by metallic poisoning. Only one oyster was examined and that was found to contain metallic copper. The oysters were traced to a bed near Perth Amboy, where there was copper coming from the copper works in that locality.

Dr. McLAUGHLIN—This oyster question, I think, is a most interesting one, but we are up against a question of pollution and what oysters we shall condemn and what oysters we shall not. In other words, if the bacilli coli communis are present in the oyster, shall we condemn it, or how much shall we allow it to contain and not condemn it? I am not speaking against the absolute care and watchfulness that are needed as regards the beds, but are we going to condemn an oyster simply because bacilli are present? They are not going to condemn a water-supply because it has colon bacilli present, but when they are present in a certain given amount of water. The same case applies to the oysters.

Dr. D. E. ENGLISH—I was very much interested in Dr. Guion's paper, and would like to suggest one more rule, and that is that we keep typhoid bacilli out of estuaries. I don't think they have any right to have typhoid bacilli in them, and would not have any to amount to anything if the discharges from patients were carefully disinfected.

THE PRESIDENT—It may be there is someone here waiting for a specific invitation to speak on behalf of New York; if so we would like to hear from them at once.

Dr. McLAUGHLIN—In reference to the appearance of typhoid bacilli in water, I would like to say that in a recent paper it was stated that sacks were filled with typhoid cultures and placed in polluted and unpolluted water, and at the end of three, not exceeding four days, no typhoid bacilli could be found in the cultures, showing that typhoid bacilli die out in this time.

RUDOLPH HERING, C. E.—I am in hearty sympathy with the paper of Mr. Harrison, as I believe that the collection of sewage from the Passaic valley and the discharge into

New York bay, under conditions specified, will be the very best solution of the sewage question of this great district. That is the problem of New York herself. Some years ago I was engaged by the city of New York to suggest what could be done to better the sewage discharge from that city, and I stated then that in my opinion there was no better way of disposing of the sewage than to carry it out to the pier heads and discharge the sewage as far out as practicable. By that means sewage would be carried out into the moving water. That is the best way, I think, to treat the sewage disposal of New York City. This proposed discharge of sewage from the Passaic valley is in the same line, although much more thorough, as the floating matter and silt is to be retained. The United States Government is entrusted with the care of the harbor, and I myself feel that they will be justified in preventing the discharge of sewage into the harbor if this silt is not taken out. Now New York cannot do that unless they build settling sewers around the city, and allow the silt to settle. That would be a very expensive thing to do, therefore I think that the plan for the disposal of sewage as recommended by the Passaic Valley Sewage Commission is superior to the discharge of New York itself. Therefore there would be no reason why New York should object to disposal as planned by the Passaic Commission, but there might be just as much reason for complaint by the State of New Jersey that the city of New York does not protect the bay better than she now does. In regard to oysters, it seems to me that the salt oyster is better than the fresh one, and that we might be on the wrong tack in freshening the oysters. Would it not be better not to raise any oysters at all in our streams which are more or less polluted near the mouth, because generally cities are near such places, but would it not be better to confine oyster beds to sections of our coast where there is no sewage, and raise oysters only where conditions are entirely safe, and watch them carefully?

Dr. N. L. Wilson—Just a word in regard to the oyster. I notice Dr. Guion said in his paper, to give the oyster a drink fattened it and made it more luscious. The oyster raised in salt water is quite as good, to my taste, as the one in fresh water, and the salt oysters from the South quite as good as we get in New York.

The President—I regret to have to bring this discussion to a close, but we have one more paper, which I think

will interest us all, as it is to be illustrated, and we will now pass on to that paper, which is an "Illustrated Discussion of Some Successful Sewage Disposal Works," by F. Herbert Snow, C. E., of Boston, Mass.

Mr. Snow then exhibited sixty-six views, showing diagrams in reference to sewage disposal near Atlantic City, the construction of the disposal works at that city, and also a number of views of filter beds in different sections of the country.* The meeting was then adjourned until morning.

THIRD SESSION.

The third session was called to order by the President at 10:20 A. M., December 10th, 1904.

THE PRESIDENT—The first paper this morning is on the "Medical Inspection of Schools," by Dr. Joseph Tomlinson, of Bridgeton, N. J. (For paper by Dr. Tomlinson see subsequent pages.)

THE PRESIDENT—This subject is one for careful consideration, and I hope there will be a full discussion of it. We will be glad to hear from anyone.

Dr. H. H. DAVIS—I have listened with interest to the paper by Dr. Tomlinson, which covers the ground very thoroughly. I would like to have the Doctor spend the day in Camden and go among our schools, and let him see how we teach physical culture. We teach hygiene in our schools pretty thoroughly. The doctor speaks of swimming exercises. I think very few schools have these. We began them in our high school, but ran short of money and had

* The Publication Committee regrets exceedingly that a report cannot be given of the "Illustrated Discussion of Some Successful Sewage Works," by F. Herbert Snow, C. E., of Boston. While fully aware of the fact that it would be impossible to do justice to his admirable presentation of the subject without inserting the pictures thrown upon the screen, we regret that the lateness of the evenig hour when presented led him to omit his address and give only a description of the various views presented, and that through a misunderstanding his descriptive remarks were not reported.

to close the pools. In many schools the inspection is like this: the physician comes at a certain hour in the morning and the children pass in front of him and then he comes again the next day. I think a man should give far more time to the matter.

JAMES OWEN, C. E.—I would like to ask whether the medical inspection of schools includes physical examination.

Dr. DAVIS—Yes, sir.

Mr. OWEN—It is my opinion that a physical examination should be made of every child in order to know their physical faults. I have in mind a case which shows what may happen. A young girl entered school, went through the high school and upper academy, and then lost her status on account of physical inability.

Dr. DAVIS—We have by no means taken this subject up to its fullest extent, because an inspector has 10.000 children and a complete record is not kept, but in each division the teacher is to some extent responsible for the physical examination. If the child seems to be deficient in any way, it is brought to my attention.

Dr. DICKINSON—This paper of Dr. Tomlinson is very good, but many of our boards are deficient in money, and we are compelled to adapt ourselves to circumstances. The method about to be employed in Jersey City is to have the teacher inspect the scholar and report apparent defects to the attending physician, and have said physician examine the case and give such attention as may be necessary.

Dr. WILSON—I should like to ask the Doctor from Camden if his is practical work. For instance, he says he examines the eyes and ears. In my city that is done, but it is not a practical examination. I would like to ask the Doctor if it is a fact that they put a child in front of a card and ask him to read the card, and if he does it, is he considered to have perfect sight? That shows if the child is near-sighted but it does not show all defects. On the other hand, when they examine the hearing, they take out a watch, and ask the child to tell when they hear it. That is not a test of hearing. If you put a child twenty feet away and whisper figures and have the child repeat the figures, you then know if the child hears. I am not saying anything against the ex-

aminations; I believe they do good, but the examination is not as thorough as it ought to be. You cannot make an examination of a child under ten minutes.

Dr. DAVIS—In answer to the Doctor I would simply say that the examiners of schools in Camden are not specialists. Whether the child requires glasses or not can be told by holding a book before it. As soon as my attention is called to some defect in the child my endeavor is to find the defect. When satisfied that there is a defect in the hearing, eyes or spine, and so report, there my duty ceases in so far as any advice to the child or treatment of the child is concerned. That duty does not belong to the inspector of schools. In New York, where they have medical inspection of schools, the most they find is a little bug in the hair, and granulated eyes.

Dr. WILSON—That is the very point I raise. I defy the doctor or anyone else, by simply putting a child twenty feet from a card, to tell whether the child has hypermetropia.

Dr. DAVIS—I understand that very well, but I said my duty ceases when I find a defect. I don't undertake to treat it.

Dr. HEDGES—If an examination could be made of all school children I think many would be kept out of the reformatory. A boy was refused admittance at the schools because of his bad character, and was finally sent to the reform school. Upon examining him there, it was found that his skull was fractured. Since this was remedied there has been a great change in the boy. He has reformed as to many of his faults, and is becoming a useful member of society. I believe many a child is sent to the reform school on account of physical disabilities.

COL. GEORGE P. OLCOTT—I think that this is a subject which this Association cannot afford to let stop at this meeting, therefore I move that this subject be taken as one of the subjects for the next annual meeting. This motion was carried.

Dr. D. E. ENGLISH—This paper is to me a very valuable one indeed, and it is a subject we want to keep going. We all know how many years of effort it has taken to get the health inspectors bill through the Legislature. I don't think

anything short of legislation will cause school inspection to be made in a proper way all over the State. We cannot get legislation until after some years of persistent work. We have to get the people educated up to the point that they wish it or will allow it.

Dr. DAVIS—I think this can be accomplished by the education of a community. We got the appointment of medical inspectors after a good deal of hard work. The State Board of Education deserves a great deal of credit for the manner in which they have helped the workings of this law.

THE PRESIDENT—It is very true that progress in this line is chiefly a matter of education of the general public. The boards of education find it difficult to secure funds necessary to build school buildings and pay the salaries of adequate teachers, and also to restrict many demands brought upon them for the introduction of new lines of instruction. I don't think as a rule boards of education have really had this matter brought home to them so that they realize its true relation. I don't think they realize the way money is being wasted through defects of children under their charge, and its effect upon the teachers. It is always suggested when this matter is brought forward that more can be expected from the teachers, and of course we must rely upon the teachers for certain portions of the work, but we should remember that the school teachers of the country are overburdened with the duties already placed upon them, and while we must rely upon them to a certain extent, I think it too much to try to turn the school teacher into a preliminary medical inspector. The teachers have great pressure brought to bear upon them to keep up the school attendance, and therefore they are loath to diminish the attendance at school. If the teacher knows that every day a medical inspector will be on hand, she will have far less hesitation in taking the initiative than if the whole responsibility is upon her. I think in that way more cases of communicable diseases can be kept out of the schools than is now the case. Under the new school law the whole matter is in the control of the board of education. We have worked a great many years to introduce medical inspection of schools in Montclair. The board of health has induced some of the younger physicians of the town to undertake this work and make a test of it in a preliminary way in order to have some results to bring before the public. Four

or five physicians are volunteering their services to make one thorough inspection of all the schools in the town. They will receive very little compensation for their services. The board of health will pay them. When we get public sentiment up to the point of desiring inspection of schools we shall find it easier to solve these problems.

Dr. TOMLINSON—I would like to make a motion that this question of legislation as regards the medical inspection of schools, and the introduction of a department of physical instruction into the schools, be referred to the Legislative Committee of this Association.

This motion was carried.

THE PRESIDENT—The next paper is, "Can an Outbreak of Measles be Controlled?" by Dr. T. N. Gray, of East Orange, N. J. (For paper by Dr. Gray see subsequent pages.)

THE PRESIDENT—Dr. N. L. Wilson will open the discussion on this paper.

Dr. WILSON—It seems to me this is a timely paper. I think we all recognize the seriousness of measles when we take into consideration the high mortality. Of course, the mortality from measles is different in different epidemics; the average, so it is said, is eight per cent. The sequelæ of pneumonia is a serious matter. In 1897 it was my pleasure to read a paper before this Association on the notification of measles and whooping cough. In the discussion I remember one gentleman said every healthy child should be exposed to measles. There may be some good gentlemen here who take that same view, but I think they will be in the minority when they remember the high mortality from measles. I don't believe that the public in general are educated to the fact that measles is a serious disease. There is more than a grain of truth in what the Doctor said in regard to the attitude of sanitarians toward measles. We have said nothing can be done, but that certainly is not the attitude of true sanitarians. Measles can be diagnosed early. We often see cases of diphtheria which we cannot diagnose until we have made cultures. Measles can sometimes be diagnosed two or three days before the eruption occurs. As to the practical part of this subject, how are we to limit the spread of measles? There is one public school in my town, the principal of which is a highly intelligent

man, and I am glad to say that cases of communicable diseases are fewer in his school than in any other school in town, and he has 800 pupils. Every morning when the children assemble the teacher first asks the pupils in her room, "Do you know of anybody in your neighborhood who is ill?" and one of the pupils says, "Yes, someone living across the street is ill." The teacher makes a note of it and telephones the communication to the superintendent of the school. In that way the superintendent is often advised of illness long before the board of health is advised of it. The teacher also looks over her school and if she sees any child with hanging head, eyes watery or nose discharging, she says, "You go and see the principal." The principal looks at the child and may send it home. We put the responsibility on the principal, as we have not inspectors to look after so many children. The Doctor made one pertinent remark in regard to the fumigation of schools. I doubt if there is a school in our city that is ever fumigated unless an epidemic arises. I think that would help clean up the school-houses.

Dr. Marcy—I would like to ask what method of fumigation the Doctor would advise. There seems to be no form of gaseous fumigation which will, with any certainty, destroy the germs of diseases in this way. Would it not be better to cleanse the rooms with a bichloride solution. The question of measles is a somewhat local one in regard to fatality, and due also to climatic conditions. In the south and warmer climates they don't regard measles as anything at all. Without any doubt measles in this location is a much more serious matter, and while I am not quite willing to say that a child should be exposed to measles, certain it is if a child in good physical condition, and under proper restrictions and supervision, could have that disease at a certain period of life, say between the years of three and six, it would be much better than to have it at twelve, fifteen or twenty.

Gen. Woodhull—I am unable to agree entirely with what has been said in relation to measles. Certainly, as the last speaker maintains, it is not desirable actively to expose all children to measles. Nevertheless, as it seems impossible entirely to destroy this extremely active contagion, it is much better to limit the disease to children between the ages of four and twelve than to allow it to spread among

those younger or older. The mortality following measles is considerable, but that is largely a question of age and of climate. Very young children, especially under unfavorable surroundings, will succumb to the bronchial complications. When those approaching or having reached adult age have measles in cold climates, consecutive catarrhal pneumonia is very fatal. During the Civil War there were among the Union white troops 67,700 cases, with 4,200 deaths from this cause. With the colored troops the ratio of deaths to cases was nearly one to nine. As a rule the severity of the disease increases with the age of the victim, and when grown persons go from isolated country places, where they have not been exposed, to cities or newly-organized camps, they are certain to contract it. In the extreme south in 1861-2, whole regiments, and indeed brigades, recruited from the rural districts, were so ravaged that they were temporarily disbanded.

Under the circumstances in which we are obliged to live, I do not think it well to lay too much stress upon a suppression which at best can only be local and temporary, for as soon as those who are not protected go elsewhere they are pretty sure to get the disease and to suffer from it more than they would have done earlier in life. It is conceivable that a small community may be free from measles for a number of years, but every member of it will remain susceptible and cannot be expected to escape the contagion permanently. Hence this temporary immunity is liable to lead to more serious ultimate consequences. I do not wish to be misunderstood as advocating the introduction of the disease in public schools, but as hoping that there may be found a happy medium so that a way of escape may be opened for the very young and for those grown up. A practical difficulty in the way of controlling measles is, that frequently it is so light and is so readily treated by domestic means, so that no ordinary regulations will reach the cases and they continue to be unreported infecting centres. It is better to have no rules than to make good ones that cannot be enforced.

Dr. Davis—My experience has been, if one case happens to get into a school, very few escape. In our board of health we adopted a resolution requiring reports of measles, but we don't get it done. I think the thing to prevent the mortality is to educate the people to the fact of the seri-

ousness of measles. In regard to the fumigation of schools. In case a child is exposed to measles he is kept from school for sixteen days after exposure, unless the attending physician sends a certificate to the contrary. Those who have an attack may return after three weeks, or when all desquamation or coughing has ceased. Should a case occur in a school-room we close that division after school hours are over, and wash the walls and woodwork with a solution of bichloride of mercury 1–1000. We then follow up with a fumigation. We believe the most good we derive is not from the fumigation, but from the cleaning with bichloride of mercury. This is done if a child is taken with any communicable disease in school.

Dr. Wilson—I admit that I made a mistake when I said fumigation. I did not mean fumigation. I have no faith in any gas in the killing of germs. What we do is as the doctors have outlined. We wash down with soap and water and bichloride.

Dr. J. H. Hance—The chief reason that measles is such a dangerous disease is due to the weak position physicians and the public have taken in regard to the disease. That measles can be controlled is certainly true, because I have done it in the home, in hotels and hospitals, and can personally state that you can certainly control an epidemic of measles. How are you going to do it? The way is to educate the public, and then get the physician to report the disease and to examine the children so that he can detect the disease in the early stages, because it is contagious in the early stages.

Gen. Woodhull—In regard to the question of the adult getting measles and suffering more seriously, I think one reason why is because they are not treated for a proper length of time, as adults have their own way and go about long before they should be permitted to do so. The child is kept in bed or in the house.

Dr. Leal—I would like to make one point. We gather here every year as sanitarians and as members of this Association, and are supposed to be a body of men to study a way to protect the public health. I have heard the statement made for years which was made here to-day, that measles is in a class by itself. Why is that so? I have heard the same statement made in regard to smallpox in

Mexico—that the best time to have it is in childhood; that the person who contracts the disease then is protected in future. The same argument might be made in reference to scarlet fever. Why has the change come? Simply because the medical profession is educated up to an appreciation of the gravity of these diseases, and the public has been so educated. I believe it will be the same way in regard to measles. I would like to say a word in regard to my friend, Gen. Woodhull's, argument—the disease that is most dangerous to a large body of men is typhoid fever. No sanitarian would use this argument in reference to typhoid fever. I believe the thing to be aimed at is the prevention of the infection of both measles and typhoid fever.

Dr. D. E. English—The question of measles in the city and measles in the country is an entirely different thing. Measles in the city is a very fatal disease. Measles in the country is a trifling disease. Children don't often die of measles in the country. I have been practicing in the country in one place for eighteen years, and have had four epidemics of measles. Every child who had not had it before when measles came had measles. In that time I lost one case, a young baby that had diarrhœa before it had measles. It is shutting people up in the house where they cannot get fresh air and sunshine, and where they get pneumonia, that is fatal. Keeping the windows open and allowing the sun to come in is what makes measles trifling in the country and fatal in the town.

Dr. Wilson—In regard to the remark about opening the windows and letting the sun come in, we all know we keep the room dark to protect the eyes. It really is not necessary to keep the room actually dark, as the ordinary shade is sufficient to make it dark enough.

Dr. Gray—I would like to say that the views I held at the beginning have been emphasized by what has been said to-day. If measles is of no consequence, then the time spent in writing and discussing is wasted. I believe that it can be controlled and should be controlled, and I believe it is due of sanitarians and physicians to make active efforts to control it.

Gen. Woodhull—The reference made to the neglect of smallpox in Mexico hardly bears upon the point, because smallpox is a serious disease and we can prevent smallpox

by vaccination, but cannot prevent measles in that way. In reference to scarlet fever, it don't follow that every person coming in contact with a scarlet fever patient will contract the disease, but if you come in contact with measles you will contract it. I would be sorry if I have said that measles is a trifling disease; it is a very serious disease. I don't want to make any misrepresentation of that fact, but it is so widespread, and under conditions of modern life and in thickly settled countries it is much better to treat the disease as it comes than to attempt to prevent persons acquiring the disease, for a later period they will come in contact with it and suffer so much the more.

THE PRESIDENT—I wish to be on record as vigorously opposed to the sentiment expressed here in regard to letting measles go uncontrolled. As sanitarians it is our duty to attempt to stamp out these diseases, and if proper methods are taken I have no doubt we could greatly reduce the number of cases of measles. If we pursue the modern policy of taking each disease at its source, and discovering at the earliest possible moment every case of the disease and properly isolating that patient, we will soon have stamped out measles to a large extent. One word in regard to the country argument. In this day it seems to me we cannot let any disease that arises in the country alone because it has no harmful effects in the country. People go from the country to the city every day and may be the means of causing the disease in the city. We must consider these questions from a broader standpoint. The country to-day is our great source of danger. We must direct our attention to the rural districts, and to the education of physicians and citizens and the suppression of disease at its source.

Dr. GRAY—Might I offer this suggestion? The time to work is when the disease is endemic only, because to control it when an epidemic breaks out would be an impossible thing. I believe it could be stamped out when there is a case here and there only.

THE PRESIDENT—We will now proceed to the next paper on the program, "Contagious Diseases and School Attendance," by Dr. Gordon K. Dickinson, of Jersey City, N. J. (For paper by Dr. Dickinson see subsequent pages.)

THE PRESIDENT—There is time for a very brief discussion, but if there are no remarks we will proceed to the next

paper, which is the "Prevention of the Sale of Adulterated Milk," by John O. George, D. V. S., Camden, N. J. (For paper by Dr. George see subsequent pages.)

THE PRESIDENT—I think this paper is a very excellent close to the program, which I am sure all will consider has been a very practical one. It would be very desirable to discuss this paper at length, and we will give opportunity for a brief discussion.

Mr. BALDWIN—I am sure we ought to be thankful to Dr. George for bringing this subject before us. This matter has grown, however, so that now many farmers are vying with each other to produce good milk. I think the plan adopted by some cities in making an inspection of dairies and publishing results obtained goes a long way toward getting a good article. I might mention an incident, however, which came to my attention. Our inspector was informed, the other day, of a man who was inspecting milk, and seeing no dipper in sight he asked the milkman where his dipper was and the milkman put his hand in the milk and pulled out the dipper.

THE PRESIDENT—I wish I might tell you something about the way we are trying to handle the milk problem in Montclair, but I will not try to do so. We make frequent inspections of dairies, and the results of the inspection, the analysis of the milk and comments upon the condition of the dairy are published every year in the annual report of the board in very plain language. Furthermore, that any citizen may know the quality of the milk served to him, or rather of the condition of the dairy, we have the results of the latest inspection filled in on a blank form and pasted up in the office of the board of health, and anyone may step in at any time and read the results of the latest inspection of the dairy. The dairymen have learned that it pays to co-operate with the board, and the milk is improving from year to year, but the milk comes from a large section of country, and it would be a great help if other boards of Health would join in this work. Montclair is, largely, standing the work for the whole of Essex county. Little has been done by other boards in this direct line which has come to my attention.

We will now proceed to the election of officers. The Secretary will read the report presented by the Nominating Committee and approved by the Executive Council.

The report of the committee and the names of new members were read. The report was placed on file, and on motion, the Secretary was ordered to cast the ballot for the election of the officers named by the Nominating Committee. Motion was also made and carried that the Secretary be instructed to cast the ballot for the names of the new members as read.

THE PRESIDENT—Any further business?

DR. MARCY—The matter of medical inspection of schools was referred to the Committee on Legislation. A thought I would like to have that committee to entertain is in regard to the expense connected with this question. One of the great difficulties in having this matter established is the matter of expense. The school year begins at a different time than that of the fiscal year. I think the school year in this State begins on the first of July, and the fiscal year begins some time the latter part of December, so that for one-third of the school year the schools are run on borrowed money. Is not that a very foolish way to conduct business? Is it not a fact that the money which is spent for interest could be saved and used to a better advantage? Is it not possible to have the school year and the fiscal year begin at the same time? If possible, to have the committee take this matter up, it seems to me, would be a wise thing.

COL. OLCOTT—As chairman of the Legislative Committee, I would say that if we take action as suggested by the Doctor we would have to get an amendment to the present school law. It is a very hard thing to make changes in a law, and I think it unwise to undertake it. I don't know why money should be borrowed for school purposes, and think an arrangement could be made to avoid it. I think it unwise for the committee to undertake to combine work, and think this question a matter for the municipalities. I move that Dr. Tomlinson, the reader of the paper of to-day, be added to the Legislative Committee.

This motion was carried.

JOHN B. DUNCKLEE, C. E.—I move that the thanks of the Association be extended to the manager of the Laurel House for the courtesy extended to the Association during its meeting.

This motion was carried, and the motion for final adjournment was then made and carried.

Treasurer's Report.

GEORGE P. OLCOTT, *Treasurer, in account with* THE NEW JERSEY SANITARY ASSOCIATION.

1903.	RECEIPTS.		
Dec. 1.	Balance cash on hand,		$98 18
1904.			
Dec. 6.	Dues received to date,		220 00
			$318 18
1903.	DISBURSEMENTS.		
Dec. 5.	Charles J. Merrill, stenographer,	$23 00	
	Expenses of annual meeting,	5 20	
	J. A. Exton, Secretary, expenses,	43 85	
	Treasurer, postage,	2 72	
1904.			
April	D. C. English, Publ'n Com. expenses,	6 35	
	MacCrellish & Quigley, printing report, etc.,	88 50	
			169 62
	Balance cash on hand,		$148 56

Respectfully submitted,

GEORGE P. OLCOTT,
Treasurer.

Report of Committee on Nominations.

OFFICERS FOR 1905.

President, ...Norton L. Wilson, M. D., Elizabeth.
First Vice-President, ...H. M. Herbert, C.E., Bound Brook.
Second Vice-President, ...Gordon K. Dickinson, M.D., Jersey City.
Third Vice-President, ...John B. Duncklee, C.E., South Orange.
Chairman Executive Council,....Wm. G. Schauffler, M.D., Lakewood.
Secretary, ...James A. Exton, M.D., Arlington.
Treasurer, ...George P. Olcott, C.E., East Orange.

EXECUTIVE COUNCIL.

THE ABOVE OFFICERS AND

D. E. English, M.D.,...Millburn.
William J. Harrison,...Lakewood
W. H. Shipps, M.D., Bordentown.
T. Frank Appleby,..Asbury Park
T. A. Harvey, M.D.,......Orange
H. C. H. Herold, M.D.,..Newark
H. B. Francis,...........Camden
John W. Griffin,.......Arlington
A. Clark Hunt, M.D.,..Metuchen
R. H. Parsons, M.D.,..Mt. Holly
M. R. Sherrard, C.E.,....Newark
A. W. Bailey, M.D.,.Atlantic City.
T. N. Gray, M. D.,..East Orange.
G. E. McLaughlin, M.D., Jer. City.
H. H. Davis, M.D.,......Camden
Stewart Hartshorn,...Short Hills
J. Tomlinson, M.D.,...Bridgeton.
Chas. J. Fiske,.........Plainfield
E. Guion, M.D.,....Atlantic City.
Rudolph Herring, C.E., Montclair.
J. S. Westcott,......Atlantic City
Capt. A. M. Bradshaw, Lakewood.

The ex-Presidents of the Association are honorary members of the Council. See second page of cover for full list of officers and committees.

Abstract of Report of Committee on Civic Sanitary Societies.

By Rev. Adolph Roeder, Chairman.

The committee reported concerning the excellent work which is being done by the Civic Sanitation Association of the Oranges and the Women's Club of the Oranges. References are also made to local associations and clubs which exist in other towns and are doing efficient work, and where the work is carefully planned and judiciously executed there is a growing sympathy and co-operation between them and the local authorities. They are endeavoring to secure clean streets, clean yards and clean tenements, and, as far as possible or practicable, to beautify the town and increase its healthfulness.

The committee has secured the co-operation of the State Civic Federation and has disseminated considerable literature from that and other sources on topics connected with the work. The civic organization of South Orange has also taken up with some enthusiasm the work of mosquito extermination.

Appended to this report is the report of the Corresponding Secretary of the Civic Sanitation Association of the Oranges for the year ending May 9th, 1904. It refers to the work of their Inspector, Miss Woodworth, during her seven months' service. In that time 230 inspections were made; 9 cases of tuberculosis were discovered and reported to the authorities; 73 nuisances were reported to the Board of Health or to landlords, 52 of which had been either abolished or abated; influence had been used with the West Orange Council for a new station house where offenders of both sexes would not be herded together, and that body had voted to build a new house; the Association is now working upon the tenement house problem with the hope of securing a better grade of tenements and small houses built in the Oranges; they are using the local paper weekly to inform the people of unsatisfactory sanitary conditions, and are thereby arousing public interest and securing good results. The Association has also called attention to the fact that the Boards of Health of the Oranges have no uniform code regarding contagious diseases, and that will receive proper consideration and action. The report closes as follows:

"Although we have but a small membership and are hampered by lack of funds, yet, in reviewing the year's work, the Association has every reason to feel gratified at the large proportion of successful work accomplished."

PRESIDENT'S ADDRESS.

British Municipal Sanitation.

By M. N. Baker, C.E., President of the Board of Health, Montclair, N. J., and Associate Editor of Engineering News, New York City.

We have learned much and we still have much to learn from British sanitarians; they have learned something and might learn yet more from us. In the few minutes at my disposal this evening I can do little more than present some conclusions based largely on my recent trip to Great Britain.

I shall deal at most length with sewage treatment and refuse burning. since to those subjects I devoted myself chiefly while abroad and since there is more for us to learn from the British in these than in other branches of municipal sanitation.* I hasten to add that I am more than ever convinced that the disposal of refuse (meaning by refuse garbage, ashes, waste paper and the like), is primarily a matter of public convenience and only secondarily a sanitary problem.

SEWAGE WORKS.

It is difficult to decide whether the most impressive fact regarding sewage treatment in Great Britain is the number and size of the works or the variety of methods and combination of methods in use. I visited sewage works in twenty-four localities, serving populations ranging from 4,536,000, at London, to 1,000, at the Sandhurst Military Camp farm. Eight of the works visited served places of more than 200,000 population. No two of the works I saw were exactly alike, and with few exceptions the differences in general method of treatment were marked while the details showed great diversity. I found chemical precipitation and plain sedimentation more common for preliminary treatment than I had expected, but the trend of practice is to remove

* My observations on sewage treatment are given at length in my recently published book, "British Sewage Works," and in more condensed form in "A Recent Trip to Twenty-four British Sewage Works," a paper read before the Sanitary Section of the Boston Society of Civil Engineers, on October 12th, 1904, and which will appear in the Journal of the Association of Engineering Societies. Under the title "British Refuse Destructors" I have also set forth, at more length than is possible here, a general review of that subject, and I hope to publish in *Engineering News* soon notes on the refuse destructors seen by me in Great Britain and in Hamburg and Zurich.

the suspended matters from sewage and liquefy its organic portions by means of septic tanks, and to rely upon either contact beds or percolating filters for final treatment. Septic tanks, contact beds and percolating filters are commonly spoken of as bacterial agents, but, aside from the fact that the bacterial action is intensified by them, they are no more bacterial than the older and better known broad irrigation areas and intermittent filter beds. In England, no more than in the United States, has the septic tank solved the sludge problem, and no one of the newer so-called bacterial processes, nor all of them together, can be relied upon for the complete removal of bacteria. But it should be remembered that the general object of sewage treatment is not to produce potable water, but rather an effluent that will not give rise to unsightly deposits or offensive odors.

Much of the diversity in British sewage works practice relates only to details, such as kind of filtering medium, distributors for applying sewage to beds, and drains for removing it therefrom. Many of these details have little or no significance in the United States, owing to differences in local conditions, in available filtering material, and in temperature. As a rule, however, the variations repay study to determine which are advantageous for use here, but to be of the greatest value such studies should be made by experienced engineers, chemists and biologists familiar with American practice, conditions and needs.

In one respect, British municipalities are far in advance of American, and that is in the painstaking investigations of sewage treatment which they have made. Twenty or more British cities have constructed and tested more or less elaborate apparatus for treating sewage, often on a practical working scale. In the United States the new sewage testing station built by the city of Columbus, Ohio, is the first and only comprehensive municipal experimental plant which we yet have, although Worcester, Mass., and several other cities have made commendable studies.

While we can by no means afford to neglect British experience in treating sewage, we must work out—in fact we are working out—our own salvation, although with fear and trembling. Above all, we should make the most of the possibilities already demonstrated here and do less automatic copying of British practice, regardless of differing local conditions. Other of our States should emulate Massachusetts in its Lawrence experiments, and our American cities might well follow Columbus and the British cities and towns in building and carefully operating sewage testing stations. Great Britain, it may be added, has done no central experimental work like that of the Massachusetts State Board of Health, but a Royal Commission on Sewage Disposal has been carrying on investigations since 1898, and has issued a number of valuable reports. Its final recommendations have long been awaited with eagerness.

Is it too much to expect that our own State Sewerage Commission will yet make and publish careful studies of the operations of the

existing sewage works in New Jersey? Costly experimental work it need not do; or at least such work is far less in demand to-day than scientific observations of plants in daily operation. The unexpended annual balances which our Commission has returned to the State Treasury would have been sufficient to begin the accumulation of valuable and much-needed data on the operation of sewage works in New Jersey.

REFUSE DESTRUCTORS.

In Great Britain municipal wastes other than sewage are classed as refuse, and instead of garbage being collected separately, as is so commonly done here, it is generally mixed indiscriminately with ashes, paper, rags, tins and bottles, and the whole hauled to the dump or to the refuse destructor.

Although refuse destructors or furnaces are more numerous in England than in the United States, they are far from universal, and many of the municipalities provided with furnaces still lack the capacity required to burn all their refuse. Some of the cities most noted for their refuse destructors send a large part of their garbage proper to farms, where it is used as a fertilizer. Moreover, the refuse I saw at destructors in fourteen British municipalities contained very little green stuff, and was composed chiefly of ashes, paper and other rubbish. Although these furnaces were visited in the winter and spring, when garbage proper is at its minimum, I am nevertheless of the opinion that British cities produce less garbage than do American. The soft coal burned in England, much of it in open fireplaces, results in domestic ashes high in combustible matter. Altogether, operating a British refuse destructor is quite different from running an American garbage furnace. Less wonder, therefore, is to be experienced on learning that buying fuel for a refuse destructor is unheard of in England and Scotland, and that so much heat is generated by the refuse itself as always to provide power for use at the destructor; while it is becoming more and more common to utilize the heat from refuse destructors in electric generating stations, or for pumping either water or sewage. This production of heat and power is made possible by the very high temperatures due to the excellent design of the destructors and the use of forced draft to aid combustion. It is actually achieved by passing the gases of combustion through boilers provided for the purpose. Where the supply of refuse is intermittent, or in case it is not at all times sufficient to generate as much steam as is required for power, independent boilers, fired with coal, are provided.

The high temperatures in the refuse destructors not only make the utilization of heat possible, but they also ensure the perfect combustion of the refuse and the destruction of all offensive gases, thereby performing a twofold service in the interests of both municipal sanitation and economy. The economic function is still further increased by the fact that high temperatures convert the inorganic residue into a hard,

vitrified clinker, which can be and is crushed and used in place of stone for road-bottoming and for concrete, or ground to use as a substitute for sand for mortar and plaster. The crushed clinker is also mixed with cement and molded into artificial stone for sidewalks, door and window lintels, and sills and cheap fireplaces. The fine ash from beneath the grates is also used in mortar and plaster-making, but by far the larger percentage of the destructor residue is in the form of clinker, which is drawn from the grates in large glowing masses by the skilled stokers employed at destructor works.

The marked success of the British refuse destructor is largely due to the skilled operatives employed and the trained foremen and managers over them, all of whom are chosen for fitness, and not, as in the United States, to pay political debts. But before the destructors are put in the hands of such men they are designed and built in accordance with the most advanced ideas as to furnaces for producing high temperatures and dealing with refractory materials. Here again there is a strong contrast between British and American practice. So far as our municiplities are concerned, competent and independent engineers are practically never engaged to aid in the design or selection of a garbage furnace. An American city or town which would not hesitate to call in an engineer to design a water-works, or sewerage system, or a bridge, never thinks of employing an expert engineer to guide it in solving its garbage disposal problems. The result is partly shown by the fact that half the garbage furnaces built in this country have been abandoned.

In Great Britain refuse destructors are considered as engineering works, and the selection of a type of destructor and the subsequent working out of details is left largely to engineers employed to protect the interests of the city. In America a competent engineer is rarely employed to design a furnace, and almost as rarely to stand between the interested furnace contractor and the ignorant council committee or board of health upon whom rests the responsibility of securing a furnace. Until we change our habits in this respect, Great Britain is likely to continue as far ahead of us in the burning of municipal refuse as we are, or until recently were, ahead of her in the electrical industries.

WATER-SUPPLY AND PURIFICATION.

Of water-supply, I need only remark that water purification plants are far more generally used in Great Britain than in America; that where water is drawn from surface sources it is generally filtered, and frequently vast areas of the gathering grounds are owned or controlled by the municipalities in order to keep off population and sources of pollution; and that the prevention of waste and other restrictions on consumption simplify the water question by keeping down the per capita demands for water; while, on the other hand, the denser populations and relatively small streams make it difficult to find water enough, even with low rates of consumption. I may add that several instances of

double filtration came to my attention, rapid mechanical filtration being followed by slow sand filtration. The last-named method is far the most common one in England.

PAVING AND STREET CLEANING.

The character of the paving in many British cities is superior to ours; not so much because they know better than we how to construct good pavements as because once constructed they keep them in better repair than is our custom and do not so readily permit them to be destroyed by street excavations. Wood is extensively used for paving, apparently with good results. Great attention is given to street cleaning, even in the case of macadam.

PUBLIC COMFORT STATIONS.

The numerous, well-equipped, clean and neat public water-closets and lavatories in London and other British cities and towns, including places of small size, and the general lack of such conveniences here, should put our American cities to shame. London alone has between 500 and 600 of these stations. They are often so located in the street that their entrances serve as islands of safety for pedestrians at crowded crossings.

PLUMBING AND DISINFECTION.

I speak with hesitation of plumbing and disinfection, as I did not have an opportunity to secure much information on those subjects. From what I saw and heard I concluded that the best plumbing was quite as good, but not so general as our best work; that needed improvements are greatly hampered by conservatism and by the old sanitary fetishes which magnify the importance of so-called sewer gas and filth as such, to the exclusion of the modern idea that infectious diseases are of human origin, should be controlled at their sources, and are rarely spread by poor plumbing or decomposing garbage or other matter out of place, offensive as all filth is. I also concluded that too much reliance was placed on proprietary disinfectants and deodorants of doubtful value, and that, much to my surprise, ignorant and sometimes dirty men are employed to disinfect rooms.

PUBLIC HEALTH OFFICERS AND ANALYSTS.

I met very few public health officers, but from those few, and from information gained otherwise, I concluded that we might learn much from a study of the methods employed to secure medical officers of health, sanitary inspectors and public analysts in Great Britain. It seems to be recognized there, at least far more than it is here, that

special training is required to prepare men for such positions. Moreover, proper measures seem to be taken to determine whether or not candidates for such positions really are fit for them. The work of examination, however, seems to be done largely by unofficial bodies, like the Sanitary Institute and the chemical societies. Certificates from those bodies appear to entitle candidates to special consideration. Whether or not further examinations are required I cannot say, but I infer that in each case appointments must be confirmed by the Local Government Board.

THE LOCAL GOVERNMENT BOARD.

This leads me to say that the Local Government Board has a large measure of control over all sanitary matters in England. Its engineer inspectors and its medical inspectors, one or both, hold inquiries on applications for loans for sanitary and other municipal improvements, and without the sanction of the Board comparatively little such work can be done in England. Although the conservatism common to such bodies tends to impede sanitary progress, it undoubtedly saves many errors, much waste of money and great sacrifice of life that might otherwise result from undertakings which are either experimental or have already been tried elsewhere and found wanting.

CLEAN MUNICIPAL GOVERNMENT.

It certainly will not be far from my subject if I say, in closing, that one of the strongest impressions received by me while abroad was the freedom of British municipal government from the corrupting influences of party politics, and the extent to which municipal officers are chosen and retained in service for no other reason than fitness. One of the most difficult and futile tasks I undertook while abroad was to explain to Englishmen why we are liable to change our city officials at every election. A statement of our methods of mixing national politics with what should be simply municipal business, and of our doctrine, "To the victor belongs the spoils," elicited only one response: "I shouldn't think it would work well." And when I replied, "It does not," they wonderingly asked, "Then why do you do it?" As municipal sanitarians, the members of this association may also well ask WHY? And, not content with asking, we may with renewed vigor continue our attempts to make American municipal sanitation as free as is British from the bane of partisan politics and party spoils.

The Prevalence and Fatality of Malarial Affections in New Jersey.

By D. E. English, M.D., Milburn, N. J.

Of the prevalence of malarial affections in New Jersey, except as indicated by their fatality, I can say nothing more than this, that New Jersey seems to compare favorably in this matter with other States on the Atlantic coast, and does not deserve the bad reputation that some of the newspapers, published in other States, have tried to fasten on her. I have been unable to find any accurate statistics on the subject, probably because the authorities do not require cases of malarial diseases to be reported. A study of the mortality statistics of malaria gives no clear idea of the prevalence of this disease, for a number of reasons.

1st. Simple, uncomplicated, intermittent fever in adults is seldom, if ever, fatal.

2d. The cases reported as dying of malaria were, no doubt, nearly all complicated with other disorders, and it is always a question how much malaria had to do with the fatal result, and how much the complicating disorder. * * *

3d. Sometimes cases of pneumonia, pleurisy, nephritis, meningitis and other diseases succumb because there is also present a malarial infection, which is sufficient to turn the trembling balance the wrong way. But, of course, these cases are not reported as malaria. Nevertheless, a study of the statistics of death from malaria is extremely interesting. On the chart before you, so kindly prepared for me by Dr. Mitchell, you see graphically portrayed the mortality statistics for malarial diseases in New Jersey for the last twenty-four years. You will at once notice the surprising, gratifying and almost uniform decrease of deaths from these disorders. Why the line shoots upward so curiously in 1896 and 1897 I have not been able to discover, but the reduction from 3.71 per 10,000 in 1881 to .18 per 10,000 in 1902, only one-twentieth as many, is certainly remarkable. * * *

I have found it convenient and interesting to make a more minute analysis of these statistics for the last sixteen years. The average death rate for malarial affections in New Jersey for the last sixteen years, *i. e.*, from 1887 to 1902, has been a trifle over 7½ for each 10,000 of population.

It is interesting and instructive to notice the distribution of this death rate among the separate counties. The death rate was highest in Hudson county, viz., 10⅝ per 10,000, with Middlesex, Bergen, Somerset and Union closely following. Hudson is the most densely populated county in the State, has a large tenement house population, and lies on

the easterly side of large tracts of salt marsh, *i. e.*, on the side toward which the more prevailing winds blow. Hence the high death rate there is not surprising; but why Middlesex should come next, with Bergen and Somerset closely following, is not so clear. Union is fifth in line, instead of third, as one would expect her to be on account of density of population and large extent of salt marsh.

Why Morris, with her sparse population, high elevation and few tenement houses, should be sixth, instead of sixteenth, is another puzzle. Monmouth stands seventh, with a death rate of 7½ per 10,000, considerably higher than any of the coast counties further down.

Essex county stands second in population, and also in density of population, but she stands eighth in death rate from malarial diseases, viz., seven per 10,000. Essex has a number of cities with a large tenement population, is exposed to a large area of salt marsh, and also has a considerable extent of hills and high rolling country. She also is preeminently a manufacturing county. Newark, Bloomfield, Montclair, the Oranges and the other towns along the line of the Lackawanna railroad in Essex county are supplied with unusually good and pure public water. Why her death rate from malarial disease is lower than that of such counties as Morris, Monmouth and Somerset I will not attempt to explain; that is outside the scope of my subject. * * *

In Mercer, Passaic, Cape May and Camden the death rate is nearly the same, viz., about 6⅓ per 10,000. In Salem, 5⅓, and in Sussex, 5¼. Another mystery: Sussex, with her sparse population, her high hills, perfect natural drainage, absence of swamps and mosquitoes, has a slightly higher death rate from malarial diseases than Ocean, Burlington or Cumberland counties. Ocean, Burlington, Warren, Hunterdon and Cumberland are about on a par, the rate being about 4½ per 10,000. Gloucester is 3⅚, while Atlantic, with a good part of her population lying to the eastward of extensive salt marshes, with a practically level county and sluggish streams, with many marshes and apparently poor drinking water, with her sands and swamps, instead of Sussex, with her hills and forests, stands first in freedom from malaria, with a death rate from malarial diseases of only 3¼ per 10,000.

This period of sixteen years may, for purposes of comparison, be conveniently divided into two periods of eight years each, viz.: First period, 1887 to 1894; second period, 1895 to 1902. During the first of these two eight-year periods the number of deaths from malarial diseases in New Jersey was 1,577, or about 10 5/6 per 10,000; during the second period the number was 787, or about 4⅕ per 10,000, a difference of over 61 per cent. But the reduction was not uniform in different counties. If we divide the counties into two groups, the first group comprising those in which the reduction was 50 per cent. or more, and the second group those in which the reduction was less than 50 per cent., we find in the first: Camden, Union, Essex, Middlesex, Burlington, Mercer, Atlantic, Passaic, Hudson and Warren—ten, in the order named. In the second group appear Morris, Hunterdon, Ocean, Bergen, Salem, Monmouth, Sussex, Gloucester, Cape May, Somerset and Cumberland—eleven counties, in the order named. The reduction was

greatest in Camden, viz., 84 per cent., and least in Cumberland, viz., 22 per cent. These two counties lie near together in the southern part of the State, are similar geographically, and in many other ways, yet in one the reduction in deaths from malarial diseases is greater than in any other county in the State, and in the other it is least. What has been done in Camden to cause this phenomenal decrease of 84 per cent. I do not know. In Union, where probably more salt marsh was drained prior to 1902 than in any other county, the reduction was 66 per cent., next to the highest. In Essex, where probably more has been done in the line of draining ponds and fresh marshes and in the use of kerosene than in any other county, the reduction was 61 per cent., *i. e.*, third in the list. Although Atlantic stands first in the death rate list, she stands seventh in the reduction list, with a reduction of 55 per cent.

A study of these figures seems to show that something has been done in New Jersey in the last few years toward the abatement of malarial diseases that has already borne fruit, and promises to result in time in the utter defeat of our old enemy and reproach, malaria.

Decrease in death rate between the first and second periods of eight years each:

		Per cent.			*Per cent.*
1	Cumberland,	22	12	Warren,	50
2	Somerset,	23	13	Hudson,	52
3	Cape May,	24	14	Passaic,	53
4	Gloucester,	35	15	Atlantic,	55
5	Sussex,	38	16	Mercer,	55
6	Monmouth,	39	17	Burlington,	59
7	Salem,	40	18	Middlesex,	59
8	Bergen,	44	19	Essex,	61
9	Ocean,	44	20	Union,	66
10	Hunterdon,	45	21	Camden,	84
11	Morris,	47			

Average death rate per 10,000 for the two periods, *i. e.*, for the sixteen years, 1887 to 1902:

		Per cent.			*Per cent.*
1	Hudson,	10 5/8	12	Camden,	6 1/32
2	Middlesex,	10 1/3	13	Salem,	5 1/3
3	Bergen,	9 3/8	14	Sussex,	5 1/4
4	Somerset,	9 1/6	15	Ocean,	4 7/8
5	Union,	8 1/3	16	Burlington,	4 5/6
6	Morris,	7 3/5	17	Warren,	4 1/2
7	Monmouth,	7 1/24	18	Hunterdon,	4 1/4
8	Essex,	7	19	Cumberland,	4
9	Mercer,	6 1/2	20	Gloucester,	3 5/6
10	Passaic,	6 1/4	21	Atlantic,	3 1/4
11	Cape May,	6 1/6			

Etiology of Malaria.

By J. T. Wyckoff, M. D., Leonia, N. J.

It is now settled beyond a doubt that the etiological factor in malaria is the plasmodium or hematozoa of malaria. These are found in the bloood of all persons suffering from malaria, and all persons in whom these amœba are found suffer from malaria. The theory accepted as true in former years, that malaria was an unknown poison of telluric origin, has been disproved. It is now a known poison, due to a specific germ, or parasite existing and developing in the red corpuscle of the human blood, and in the tissues of the mosquito. I think it also has a third cycle of existence at times, when it lives in stagnant or other water, whence it is absorbed by the larvæ of the mosquito, or is imbibed by man. This independent life must be recognized. To give a first cause, for we have the man infected by the mosquito, and the mosquito receiving the infected material from the man, but either the man or the mosquito must obtain the infection from some source, which would allow development independent of either man or mosquito, as in stagnant water.

The hematozoa is probably of the class sporozoa and order gymnosporidia, being a naked spore, formed by fission from its parent. It would seem that the amœba radiosa might be the remote ancestor, as some forms of this fresh water rhizapod have similar characteristics, and are found in the same sections of the country, and in the same pools and ditches that form the breeding places for the larvæ of the mosquito. These amœba are found in very slightly altered condition in the mucus corpuscles on the foot of a fresh-water snail, and have been observed also in the blood corpuscles of other fresh-water snails. It is not beyond the range of possibility to suppose that the young amœba may penetrate the larvæ and go on to a more complete life under new conditions, being injected into man by the mosquito and again taken in by a mosquito, thus living a complete cycle of life in its new environment, thereby losing connection with its early existence.

It still remains that in most cases the infection of mankind occurs from the mosquito, and if in all cases the mosquito does not receive its infective material from man, still in most cases it does. And in getting at the mosquito we get at the root of the evil, as we cut the line of communication. Therefore, we can ignore any other existence of the amœba.

We can from their morphologic, reproductive and pathogenic manifestations divide them into three groups, which are marked by their clinical results, viz., the æstivo autumnal plasmodia, the tertian plasmodia and quartian plasmodia. These groups may be further sub-

divided, but this division seems to be sufficient from our standpoint. The life cycle of the malarial hematozoa, after it finds its first dwelling place in the human blood, is divided into two periods: one spent in the human and one in the mosquito host. The first appearance in the human host is in the shape of a small translucent amœboid body, within the red blood cell, absorbing nutriment from the corpuscle, it grows and the feeding process changes the hemoglobin into pigment, which finds its way into the structure of the parasite. The amount, deposition and ability and mobility of these pigment granules differ in the three types of hematozoa. In the tertian variety the parasite is medium in size, and the pigment is diffused through the whole body, in fine granules, and is quite mobile. The amœba is also active. In the quartian type, the largest of the three and the least active, the pigment particles are larger and more mobile. The amœba has also a clear and marked outline. The smallest, the æstivo hematozoa, is annular or dicoid in form, and the fine granules of pigment are arranged about the periphery. When the parasite attains a certain size it begins to reproduce or multiply by fission or sporulate, forming gymnospores. This sporulation produces the fever, or at least the period of sporulation and fever are synonymous. This gives the division between the types as far as our clinical results show. The tertian variety reaches the height of its reproduction in two days, and we have a fresh paroxysm of fever every third day. The quartian take three days to reproduce, hence the paroxysm on the fourth day. In these two varieties the infection is stronger, and we have a very large number of the parasites reaching the sporulating stage at the same time, hence the violent paroxysm and the intermission.

The æstivo autumnal hematozoa is not such a violent infection, hence the irregular development. The reproductive stage being reached by successive groups at different times, and not so many at once. Here we lack the violent paroxysm and intermission and have a continuous febrile manifestations. In some cases there seems to be an almost simultaneous infection by two types which produces the modifications of the tertian and quartian fevers. The different types divide in a different manner on fissure. The tertian splits up into from fifteen to twenty small parts. The quartian having less fissures, forms six to twelve parts.

The æstivo divides into very many very small parts. The peculiar rosette-like appearance of the parasite is due to the radiating fissures. After segmentation the central portion, consisting mainly of pigment, remains as a residue. The mature intra-corpuscular parasites, after staining by the Ramoniski method, are seen to have a vascular nucleus, provided with a varying number of chromatin particles. The chromatin increases as the parasite matures, and at subdivision also divides in such a manner that each gymnospore forms around the chromatin and each receives a portion. The sporulation of the parasite in man may be repeated indefinitely, and the destruction of red blood cells by the multiplying parasites would logically continue until the number of the former

destroyed would be so great that the latter would find no home or food; hence both the host and parasite would perish—that is, if nothing were done to stay the development, either by nature or therapeutic measures.

Until the discovery of the mosquito as the second host we were at a loss to account for the perpetuation of the species and the manner of invading other humans.

In addition to the forms of the parasite which we have already described, we have those which do not multiply by fusion, so-called sterile cells, and do not invade the blood cells, but remain in the plasma. They are larger and some become flagellated. These flagella may also separate and float free in the current.

Until now the only form of sexual manifestation which has been observed is in the æstivo autumnal type. These semi-lunar in shape escape from the erythrocyte into the plasma, contract into an ovoid shape, and a portion of them throw a flagella. When these flagella become detached they approach a quiescent or non-flagellated ovoid and one of them penetrates the cell; the others are repulsed and continue their travels. There has, I believe, no change been noticed after this action, but I think it can be called a sexual manifestation.

The parasite takes up the second cycle, or the first cycle as we view it, when a mosquito of the species anopheles and of the female sex takes from human blood a portion containing the parasite. These parasites separates from the blood and become ovoid in shape in the stomach of the mosquito, some develop flagella, and some are fertilized by the flagella as described before. Those which become fertilized penetrate the wall of the intestine and lodge in the adipose tissue around the muscular fibres, where they remain for eight days, undergoing a stage of development. The pigmented portion grows and becomes encapsulated, encroaching more and more into the celoma. Its protoplasm becomes stated and breaks up into filaments, each with its portion of chromatin from the nucleus of the sporocyst, hence these filaments are called sporozoites and are the embryonic hematozoa. They are seen as slender filaments, slightly curved and having a particle of chromatin in the centre. When the capsule ruptures, the sporozoites penetrate the body cavity of the mosquito, find their way to the salivary glands and are thence injected into the victim when the mosquito stings.

The only mosquitoes which are thus far proven to be hosts to the parasite are those of the genus anopheles, species quadramactulata, which we must especially strive to exterminate.

The Laboratory Diagnosis of Malaria.

By George E. McLoughlin, M.D., Jersey City, N. J.

The laboratory diagnosis of malarial infection resolves itself into two methods: that of the microscopic examination of the fresh blood unstained, and that in which very thin smears of dried and stained blood are used. In the first method we have, besides the facility of its preparation, an opportunity to study the vibratory motion of pigment, amœboid motion of the parasite, and some limited phases of its natural development. For either method thoroughly cleansed and polished slides, and proper preparation of the skin of the patient before puncture, are chief requisites. The quantity of blood taken should be small, and so spread upon the slide that it is of the thickness of one corpusule only.

As to the value and reliability of the two methods, opinions vary. Naturally, the early studies of the parasite were made with unstained blood, as it is the only method which permits of the observation of certain important changes which take place in the parasite. However, I believe that the exclusive reliance upon this method has been responsible for confusion regarding the varieties of the parasite and its minute structure, and also for the failure, in some cases, to find the parasite at all. One can hardly fail to agree with Theobold Smith, Cabot or Ewing that when parasites are scarce, especially when they are of the small unpigmented form, a prolonged search through fresh blood frequently proves negative, although a few minutes suffice for the discovery of one or more parasites in the stained specimen. I, therefore, make it my practice, where the infective agent is not found in the fresh blood, to control my examination by further search through slides of the same blood which has been stained, and then have frequently found a positive result, especially where the parasites were scarce, or where they were of the small unpigmented form.

Personally, I prefer the blood smears made on the slide, not the cover glass, taking care not to touch the patient's skin when receiving the blood, and then examine this stained slide direct—that is, without the use of a cover glass.

This brings us to the question as to the best time for taking the blood smears, that is, as far as insuring the presence of the parasite is concerned. Many statements have been made that during the chill is the best time to find the malarial organism, but the speaker cannot say that this has been his experience, for I believe, from my work in this field, that during the chill many of the parasites leave the peripheral circulation and retire to the internal organs. Eight hours before or after the chill is usually the most favorable time, but even then they

may be present in such scanty numbers that a prolonged search of an hour or two may be necessary, although in Jersey City and vicinity a search of a few minutes only is usually required, if the blood be taken within twelve hours before or after the chill, and if no quinine has been given.

Ewing (1) makes the following statements concerning the occurrence of the parasites in the circulation:

1st. In all well-marked initial attacks of malarial fever the parasite can be found in the blood if examined within eighteen hours after the chill. I have found this rule frequently holds good even when patients are taking large doses of quinine.

2d. On the other hand, with very mild, or with cinchonized cases, a prolonged search is sometimes required for the detection of the parasites. Although with the best stains, I believe the time of search can be frequently reduced.

3d. In cases that have not taken quinine the parasites are usually so abundant in well-marked infections that no difficulty whatever is experienced in determining their presence. Yet we should recollect the well-known tendency of the æstivo-autumnal parasite to retire from the peripheral blood during the sporulating stage, thus leaving the finger blood almost free from organisms at certain periods of the attack.

However, it is usually the case in acute malarial fever, even when quinine has been administered, that the parasites can be found if the stained blood be examined with care and persistence within eighteen to twenty-four hours after the chill. The question whether fatal malaria exists without the presence of demonstrable parasites in the blood has not yet reached complete solution. It is believed there is little doubt, however, that in acute paroxysms, fatal on the fourth or fifth day, or later, the energetic use of quinine may rid the blood of all amœboid bodies, although the patient dies from the attack. If the blood of such a case be not examined until the third day, the result may be negative.

We have been speaking so far as regards finding the parasite within the red blood cell. About two years ago, however, while making differential counts of the white blood cells in malarial patients, I was impressed with the fact that here we frequently have a variation from the normal differential leucocytic count, which is quite constant, and is found even when the malarial parasite itself may be absent from the peripheral blood, or but present in very scanty numbers. This particular finding consists of a relative increase of the large mononuclear lymphocytes, which normally compose two to six per cent. of the white blood cells, to twelve to thirty per cent. We can find pigmented mononuclears after all the parasites have disappeared from the peripheral circulation, but the relative increase of the large mononuclears persists even longer, and, what is of more importance, is present more uniformly.

Krauss (2) says: "If we have a leucocytic count showing upward of 15 large lymphocytes, and less than sixty polymorphonuclears, in the absence of an adenopathy and prior to the third week of a fever,

neither the presence of a malarial organism, nor the absence of a widal reaction, is needed for a diagnosis."

A number of English observers have also lately laid great stress upon this relative leucocytosis of the large mononuclears in malaria as a point of differential diagnosis between it and typhoid fever. Namely, Stephens and Christopher (3), Rogers (4), and others.

As to stains, Wright's (5) modification of Leishman's stain, which is fairly simple in its use and constant in its results, has given me good satisfaction.

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The Prevention of Malaria.

By S. E. Armstrong, M. D., Rutherford, N. J.

The time has been, and not so long since, when one writing a paper on the prevention of malaria would find himself confined to an advocacy of the use of drugs, diet and a change of climate as preventive measures; but all this has, in a very large measure, changed since the discovery of the plasmodium and the mode of its inoculation into the system. We have added certain sanitary measures which we are more and more believing, as experience and scientific investigation go on, occupy the first place in the matter of prevention. We may well say that few discoveries during the history of man offer greater assistance to preventive medicine. It is generally admitted that the plasmodium is the sole infective principle in malaria, and that the anopheles, through his suctorial bite, is one of the inoculators of the human family, if not the only one. However, there are some, and I count myself among the number, who believe that in malaria, as in some if not all the other infectious diseases, two things are necessary in order that we may contract the disease; first, a suitable condition of the system—that is, in the case of malaria, probably of the blood; second, the inoculation, and in due time the disease will be produced. Now I feel that an apology is due Dr. Wyckoff for writing, even this little, about the

etiology of the disease; but, fearing that he might differ with me on some of these points, I felt it necessary to trespass on his territory just a little in order that I might discuss the prevention of malaria from my standpoint. I have no doubt that the doctor will agree with me as to the source of the infection, but he may not coincide in the nature of the soil for the development of the disease; and, indeed, so far as my knowldge on this point is concerned, I can only put my remarks in the forms of a confession of faith, and say "I believe."

Now just what this condition of system is I cannot say. Dr. Cadwallader, of San Francisco, says that it is an hydræmia, and presents splendid arguments to prove his position. Be that as it may, for present purposes we only need to say that the victim has been out of health for some time before the inoculation takes place; therefore, so far as man is concerned, if he wishes to avoid infection, one very important thing for him to do is to observe all the laws of health; he should avoid overindulgence or excesses of every kind. Overeating, a sluggish liver and constipation have, in my opinion, been many times contributory causes in attacks of malaria; so also have an improper regard for suitable hours of work, recreation and sleep.

Let the body become debilitated from any of these causes and the power of resistance is lessened, and the individual will more readily yield to the onslaught of the plasmodium, and when the disease is once established it will be much more difficult of cure. Night or early morning are, in my opinion, not of themselves as harmful as at one time thought, especially if one be properly protected from dampness at these hours. Surely, if one wishes to inhale pure air, at night or in the early morning, he must breathe the air, the free and circulating air, of those times; it is a fact that these are the best business hours of the anopheles; that fact in former times gave them their bad reputation as malaria breeders. Our houses should be constructed on the best sanitary principles; fresh air and sunshine should always be allowed to come in whenever these exist outside; blinds should never be an incumbrance to a dwelling; sunshine should be allowed to enter freely, along with happy hearts and good cheer. At one time the exhibition of certain drugs was supposed to prevent the onslaught of malarial fever, and I am not sure that we are ready as yet to abandon that theory. Notably among them are quinine first, arsenic second, and iron third, taken separately or in combination. A dose of calomel now and then for those good eaters who have sluggish livers, and at the same time cannot live behind mosquito screens constantly, is a good thing. But, enough of this plain, ordinary, every-day matter; let us turn to the marvelous; and just here allow me to utter a prophecy: The time is coming when the State of New Jersey will be absolutely free from malarial fever; that time is not far distant for the thickly-settled northern part. A little conversation with the oldest inhabitants is often edifying. What is the evidence that they bring? Simply that the number of cases of malaria per capita during a season is far less than it was during the early times. And why is this so? Partly because the people are living

better hygienically than they used to, but mainly because the increase in population has taken up the land, improved it, and in a very large measure destroyed the breeding places of the malaria-carrying mosquito. A wonderful work has been unwittingly done. And now that the people have the true knowledge of the cause of malaria laid before them, what should they do? Through the discovery of Laveran, the investigations of Ross, Reed and others, the work of Howard and our own State Entomologist, and still others—for a mighty army of intelligent men have become deeply interested in this subject—the evidence is all in, the case is made up, and the people are the jury.

That malaria is a preventable disease there can no longer be a question. Will we screen our houses? We have done so for some time, and will probably continue to do so for years to come. It is a preventive. Will we pour oil on swampy places or over water in rain barrels? This is a trick we have recently learned, and we find that it kills the mosquito while in his swaddling clothes. It also is a preventive of malaria. Will we plough little ditches through swamp lands, thus allowing the fishes to get at the mosquito in her larval or pupal stage and devour her? We have tried it and found that it works quite well. But, gentlemen, all of these means are in the nature of "kindergarten" prevention and do not go thoroughly to the root of the matter. Of course, the underlying principles involved in the prevention of malaria is to be found in isolation, not however, in the isolation of a patient from his fellows, as the screening-in of a sick one—this seems to me to be quite impracticable and bearing something the nature of a hardship—but rather in the isolation of the infecting agent, the anopheles, from entire communities, by destroying him in his infancy, or by robbing him of his home for breeding altogether. You all know the methods well. This old lady is the damsel of the tin tomato can and like receptacles. I grieve to say that she will rear her young in almost any sort of a place that contains water. The thrifty dweller will confiscate her breeding place and in some way or other destroy it, but there are conditions too large for the single dweller to handle; then the municipality should take a hand in the business; but again there are breeding places so extensive that neither the individual nor the municipality are able to cope with them; then the State should buckle on its armor and march forth to certain victory. Before this can be done, I have no doubt that the laws bearing on this subject will have to be revised or amended. I understand that we have no such office as State Engineer; nevertheless, large works are being constructed on the meadows and breeding places in consequence thereof, and are being created by private individuals and corporations without let or hindrance by the State. The East Jersey Water Company, in recently laying its immense main across the Hackensack meadows, constructed breeding places large enough to furnish one hundred billion mosquitoes per second during the summer months, and you may figure the resultant of a season for yourselves. Either a commission should be appointed with power to handle the whole subject or the office of State Engineer

should be created, and the official given ample powers. I understand that we do have a State Commissioner of Highways. I presume that that official knows a mosquito when he sees one, and I trust that in laying out new highways he does not also lay out new breeding places for them. I hope that I am not wandering too far from the strict limitations of my subject; I am well aware of the fact that the malaria-carrying mosquito is not a great traveler, but we should remember that if the population of the northern counties continues to increase during the next twenty years as it has during the one just past, she will not, at the end of that time, be obliged to journey very far from any given point to find a victim. In handling the subject of mosquito extermination and consequent malarial prevention, it is well to let the people understand that the end attained will be of vast benefit to property and that the valuation will be immensely increased, thereby decreasing the rate per cent. of taxation or increasing the funds which will come to the State Treasury, as the exigencies at the time may require. Where possible to destroy breeding places by filling in and grading, this should be done, and done in such a manner as to render the land tillable or inhabitable, or both; when necessary to do ditching this should be done with the same object in view. In some parts of the meadows canals should be dug of sufficient width and depth to carry small craft, enough soil being taken from them to fill the interspaces to a point considerably above high-water mark. This means the reclaiming of lands and of lands which, when reclaimed, will be of immense value. I dare say that before this can be done vast improvements will have to be made in our dredging machinery, both in point of construction and motive power. At the risk of being expelled from the Doctors' Union and at the same time of being boycotted by the Engineers' Union, I am going to suggest that a system of dredges run by electricity from a central power station on the trolley plan ought to offer an economical method of doing the work. At the risk of being fired on by the inventors of this association, I am going to suggest that the dredges, instead of being of the shovel sort, should be constructed on the endless chain and bucket pian, similar to those used in some of the surface mining operations of the West. If all this is done the anopheles and his brethren, I am sure, will not be able to stand the racket. I give him and them credit for having sense, and, like the buffalo and the deer, they will betake themselves to more hospitable climes. I am reminded of an illustration which appeared in *Puck* some years since; the time depicted was the opening of the hunting season. In mid-air there was a snipe holding a diminutive traveling bag in her talons, and she turned her head in her flight and said, "Come on, Father Snipe, I think I heard a gun." In due time I fancy that Mother Anopheles and her sister tribes will take to flight, and holding their diminutive traveling bags in their talons will call out, "Come on, Father Anopheles, and everybody, I think I heard the shouts of workmen, the rattle of their picks and shovels, the grinding of machinery." I believe the State Engineer is coming to clean up our flat.

Oysters and Clams as Vehicles for the Transmission of Typhoid Fever.

By Edward Guion, M. D., Atlantic City, N. J.

It is the writer's opinion that oysters and clams may, under certain conditions, become the vehicle for the transmission of typhoid fever. This possibility is not by any means universally admitted. Individuals commercially interested in the shell fish industry are very naturally prejudiced against accepting circumstantial evidence tending to injure their business.

Hard-headed scientists who want absolute proof of the specific infection of the food in any case followed by indisputable evidence, exclusive of all other, or direct connection between this specific infection and the sickness alleged to be caused by the eating of the food, have thrown much discredit upon the foundation for the belief that more typhoid fever than can be traced to its cause is really attributable to sewage-polluted shell fish.

But it would seem from the mass of accumulating evidence that the only safe conclusion is that the forces of sickness and death are harbored within the shells of some oysters and clams, and that they have been the vehicle for the transmission of typhoid fever.

The following resolution, adopted by the Conference of State and Provincial Boards of Health of North America, held at Baltimore recently, shows that this matter is considered of serious import:

Resolved, That, in view of the fact that typhoid fever has been frequently traced to the use of oysters, this Conference recommends legislation by the several seaboard States which will prevent the propagation and fattening of oysters in sewage-polluted waters.

The following cases are cited out of a great list available for the purpose. They are of profound interest to us because reported by reliable authority:

The first case known to the writer which attracted widespread attention to the possibility of the transmission of typhoid fever by polluted oysters was that which occurred at Wesleyan University in 1894, reported by Professor Conn.

The history of this epidemic points so conclusively to the eating of oysters as the cause for the epidemic of typhoid fever that I shall present it in full in this paper.

About October 20th several students in the college were taken with a mild form of sickness, accompanied by a slight fever. This was not thought of much import at first. The number of cases increased, however, and some of them became more severe, until after about one week,

when the diagnosis of typhoid fever was made. For a week and a half following October 20th the cases increased rapidly, and by November 1st, there were over twenty cases of sickness among the students, accompanied by fever and with more or less typhoid symptoms.

After November 1st the appearance of new cases declined. This limitation of dates is very important in the subsequent consideration of the epidemic. In all there was a total of twenty-five cases of sickness, which were accompanied by fever. Of these, twenty-three were pronounced by the physician in charge typhoid fever.

As soon as it became evident that the disease in the college was typhoid fever a committee was appointed to investigate the trouble in order to determine the cause of the outbreak.

After eliminating the water-supply, milk and all other possible causes, the case was traced, as this report will show, to the eating of oysters at a banquet held October 12th.

The date of this banquet, it will be noticed, is just the proper date to explain the outbreak of typhoid fever on the 20th of October and its disappearance after the fourth week following the banquet, November 10th. Indeed, these dates in themselves are almost sufficient to demonstrate the banquet as the source of infection.

At this banquet raw oysters were served, among other things. All other articles of food were excluded as causative factors after a very rigid investigation.

The oysters were served on the half shell as a single course at the beginning of the banquet. It was therefore quite probable that all persons who attended the banquet ate of them except such as had a special dislike for oysters. Inquiry elicited the information that all but one of the students who were sick had eaten of the oysters, and he was too ill to give the desired information.

It was learned that at this banquet were quite a number of persons not students at the college, who lived outside the town. Letters were at once sent to them, and reports returned showed four cases of genuine typhoid fever and several cases of slight illness (chills, diarrhœa, weakness, etc.). These may or may not have had some connection with the infection.

Inquiry showed that the oysters in question had been taken from deeper water in Long Island Sound and had been brought into the mouth of the creek and allowed to lie in fresh or brackish water a day or two for fattening before they were taken out of the water and sent to the consumers. During this period of fattening the oysters are known to absorb fresh water, swell up and become quite plump. Close to the oyster beds where this fattening occurs are the outlets of a number of private sewers. At a distance of a few hundred feet from the beds where the oysters were fattened was an outlet from a private sewer from a house in which were two cases of typhoid fever.

When the grounds were surveyed it was further noticed that at the rising tide an eddy was found to be settling along the shore from the region of the sewer outlets upstream, in the direction of the oyster beds.

This condition would plainly make it possible for typhoid contaminations from the sewer to be carried to the oysters.

For the benefit of those who do not understand the term "fattening" or "freshening," as applied to oysters, I would state that the salt oyster in its original condition has a disagreeable bitter taste and is thin. To overcome this taste, and to make the oyster more presentable, the oysters are put into a float or bed containing a mixture of salt and fresh water in certain proportions, where they are allowed to remain for 24 to 48 hours. They are then ready for delivery.

In a number of cases known to the writer it is the position of this freshening bed, *i. e.,* close to the outlet of sewage, and the source from which water is obtained, that causes the pollution of originally unpolluted oysters.

Report by Dr. H. Timbrell Bulstrode to Local Government Board, London, England: On November 10th, 1902, there took place at Guildhall, Winchester, a dinner to the ex-Mayor, 134 guests being present; ten persons developed typhoid fever and a number of others developed gastro-enteritis of varying degrees of severity, about 63 in all. Investigation proved that of the 63 persons who became ill, all but two ate raw oysters. Of the cases of typhoid fever all of the ten ate raw oysters. It was ascertained beyond a doubt that oysters were the only article on the menu partaken of by all of the persons suffering from typhoid fever.

The fishmonger from whom the oysters were procured by the caterer stated that he in turn obtained them from an oyster merchant at Emsworth on November 10th, the day of the banquet. These oysters were delivered to the fishmonger's shop in Winchester, "given a drink" of salt water, opened at the shop, delivered to the banquet on their flat shells on a tray, and forthwith spread out by the waiters on the plates, three oysters being placed before each guest.

These oysters were imported into England from France, to be laid down or stored in the waters of Emsworth. It was learned that the oysters came originally from a source other than Emsworth, and that they had been stored in the ponds of Emsworth for a few days.

Mayoral Banquet at Southampton.—This banquet was held on the same date as the one at Winchester (November 10th, 1902), 132 guests being present. Eleven developed typhoid fever and others gastro-enteritis; in all 55 were taken sick. Fifty-four of this number ate oysters, and all of the typhoid fever cases ate oysters.

The oysters consumed at this banquet were obtained by the caterer from a firm of local fishmongers, who in turn procured them from the same firm at Emsworth as that which supplied the Winchester banquet.

Investigation of the oyster-supply showed that Emsworth ponds were used mainly for the storing of oysters, into which the sewage of Emsworth emptied. At about this time, or, to be more exact, between October 22d and December 8th, 1902, there were in all nine Emsworth houses (comprising 13 cases) invaded by typhoid fever, and six of these houses were invaded before November 10th. The shop water of infected

dwellings, which would be apt to contain the washings from bed linen, etc., as also some of the excreta, passed, in every instance but one, into the sewer. It may, in fact, be said that every house save one communicated in some measure with the sewers, and that specifically-infected material from eight out of the nine houses had opportunity of entering the outfall sewer which discharges near to the oyster ponds.

Dr. W. Wilson, of London, cites three instances which appear sufficiently conclusive. He says:

"About ten years ago Mrs. S. requested me to visit one of her daughters, whom I found with a high temperature. The next day the son was attacked in the same way, and a few days later a second daughter. On inquiry it transpired that the family had been staying at Naples. Raw oysters formed part of the menu of their daily dinner. The mother did not partake of them. The eldest daughter ate of them once; violent vomiting and diarrhœa followed. The three others ate them daily. They all contracted typhoid fever. About the same time another lady requested me to see her daughter. I found her suffering from fever. On inquiry I found that they had been stopping at the same hotel at Naples as Mrs. S. and family, and dining daily with them. The mother had not eaten oysters, but the daughters had."

A party of friends went to the theatre and afterwards supped together. Raw oysters formed part of the repast. Two of them ate of them and contracted typhoid fever; the others did not and escaped.

Sir William Broadbent, Bart, M. D., makes the following report:

"I saw on November 12th, 1894, a young married lady who had been confined a little more than one month previous to the time of the attack for which I was consulted. She had made a favorable recovery. The precautions against the communication of disease of any kind was more than usually careful. Milk and water were boiled and the sanitary arrangements of the house were perfect, no other occupant of the house was ill in any way. In the course of her convalescence from the confinement she had eaten raw oysters, and in about ten days later was attacked with typhoid fever.

"On December 6th I saw in consultation a young man who three weeks before had had an attack of bronchial catarrh. During this time he partook freely of raw oysters. The sanitary arrangements of the house were faultless. No other member of the household suffered. No other source of the attack of typhoid fever from which he suffered could be traced."

Chantemesse, in Gaz des Hopitaux, No. 64, 1896, alludes to the danger of infection with typhoid fever through oysters. He cites particularly an instance of fourteen persons in six families who became infected. The other members of these families who did not eat oysters remained healthy, eight of the patients had mild symptoms (pain in the stomach, vomiting, diarrhœa, loss of appetite and tympany) for two or three days; four younger members, who had eaten only a little, had severe symptoms of the same general character with dejections of dysenteric appearance. Two others, of twenty and twenty-one years respectively, had severe cases of typhoid fever, and one died.

The illness was not one of simple poisoning, such as occurs after consumption of ordinary shell fish. Finally the author was able to show by direct experiment that typhoid germs become incorporated in the body of oysters when the latter are placed in infected water.

Dr. Newsholmes' annual report of 1894 refers to fifty-three cases of typhoid fever, and states that after a careful and exhaustive inquiry into the circumstances attending the onset of these fifty-three cases, he was led to the conclusion that fifteen of them were caused by sewage contaminated oysters, and that six cases were ascribable to other contaminated shell-fish eaten in an uncooked condition. Of the latter one was caused by clams, one by cockles and two by mussels, which in each case were eaten raw. Dr. N. adds that at least forty per cent. of the cases of typhoid fever originating in Brighton during 1894 were ascribable to sewage contaminated shell-fish.

G. J. Foot, in a paper on "A Bacteriologic Study of Oysters, with Special Reference to Them as a Source of Typhoid Infection," states that oysters were inoculated with typhoid, and the germs proved to live forty-eight hours.

Freytag found that bacilli typhi abdominalis would live in concentrated salt solution five months.

Giaxa detected it in unsterilized sea-water after nine days from the date of infection. In sterilized water after twenty-five days.

From Foot's paper we find that his experiments do not throw very much light on the question of the multiplication of the bacilli typhi abdominalis in oysters. They do however seem to show that if multiplication does occur it takes place within the first two weeks, and that after that there is a progressive decrease in the number of the typhoid bacilli found in oysters, but that they may be found even after thirty days from the date of infection. They further show that these bacilli not only live in the juice, but penetrate into the stomach and live there for some time. In fact, they live longer in the juice and stomach of the oyster than in the water in which the oyster grows.

Journal of the French Academy of Medicine, 1896, paper, "The Spread of Disease Through Agency of Oysters," relates cases of typhoid fever caused by oysters, and experiments upon the life of typhoid germs in oysters. The germs lived forty-eight hours.

Public Health Journal (England), 1900, gives results of investigations by Drs. Burdoni, Uffredizzi and C. Zenobi. They proved firstly that the typhoid bacillus would live in sea-water for fourteen days; secondly, they found bacilli coli communis in oysters.

The writer's opinions have been put into practical operation in his own city. As a member of the Board of Health of Atlantic City, he has had opportunities for observations and study which has broadened his views and brought the subject home with a good deal of force. Three years ago there was a small epidemic of typhoid fever there. This affliction was needed to focus public sentiment to the peril of eating sewage-polluted food.

The city is in the center of an extensive and productive field of shellfish, not only are large quantities of oysters and clams consumed locally, but the shipments to other places are very large.

In 1903 there were 75,500 bushels of oysters consumed in Atlantic City, and 3,820,000 clams. There were also shipped away 20,000 bushels of oysters and 5,240,000 clams.

Most of this product was brought in by boat from local waters within a radius of ten miles, 87,000 bushels of oysters and 8,915,000 clams were so obtained. The remainder of the total yearly traffic was shipped in by rail. Sixty per cent. of the oysters and seventy per cent. of the clams are handled in the seven warm months of the year.

The original sources of these oysters are unpolluted; 25,000 bushels come from Eagle and Grassy Bays, 14,000 bushels from Absecon and Lakes Bays and 53,000 bushels from Great Bay.

Formerly these oysters were freshened or fattened in floats located in the thoroughfares about Atlantic City where sewage is discharged. This practice was determined to be a menace to the health of the community, and the local Board of Health prohibited, under penalty for violation of the regulation, the laying down of oysters in any waters within the city limits. Of course, this caused a storm of protest from those engaged in the industry. But that did not matter. One result of this action was the establishing of public confidence in the purity of Atlantic City oysters. In consequence traffic in this article of food has increased. To-day the dealers are in hearty accord with the action of the Board of Health.

Prof. F. Herbert Snow, of Boston, who is an expert on questions of sewage disposal, is authority for the statement that examination by him of water (as well as clams and oysters) taken from waters adjacent to the outlet of a sewer shows the presence of the coli bacillus in large numbers.

Bacteriological examination of the water in the vicinity of the outlet of this sewer gave the following results:

Distance from outlet of sewer.	*Total number of blood temp. organisms per c. c.*	*Total number of intestinal organisms per c. c.*
1,000 ft.,	1,150	520
5,500 ft.,	380	130
6,000 ft.,	220	130
12,500 ft.,	130	62
13,500 ft.,	16	7

The water immediately over the outlet contained 1,000,000 blood temp. organisms per c. c., of which nine-tenths were intestinal.

Clearly, clams taken from unpolluted sources ought not to be laid down in sewage contaminated waters, and legislation calculated to prevent this should be passed. Oysters taken from doubtful sources should be laid down in unpolluted waters for a period of two weeks.

It has been found that by this process the oysters purge themselves of all sewage germs, and are rendered safe as food for human beings.

In the writer's opinion, there is a zone of pollution established by the mere fact of the existence of a populated city upon the banks of a stream or tidal estuary which makes the laying down of oysters and clams in these waters a pernicious custom if persisted in, because it renders these articles of food dangerous at times, and always suspicious.

The writer, as a remedy, would make the following suggestions: 1st. Waters within territory of cities into which sewage is allowed to empty should be declared unsuitable for the cultivation of oysters or clams, and that beds in such waters should be abandoned. 2d. That oysters and clams taken from safe sources should *not* be laid down for any purpose in polluted waters. 3d. Oysters taken from doubtful sources should be kept for a period of at least two weeks in unpolluted water before being placed on the market.

The mere wash from streets and yards is in itself polluting The bacterial contents of water taken from conduits receiving the storm water from roofs, yards, streets, gutters, etc., is not much different from that of home sewage. So it seems reasonable and only safe for the public health authorities to recognize such a state of affairs as a permissable or legal, natural, unpreventable pollution of waters within immediate vicinity of large cities, and, in accordance therewith, to frame such regulations as shall effectively prohibit the contamination of otherwise pure oysters and clams by their temporary laying down in the doubtful or polluted waters.

Is there Any Hygienic Objection to the Proposed Discharge of the Sewage of the Passaic Valley Into New York Bay.

By Edlow W. Harrison, C.E., of Jersey City, N. J.

The Passaic river, below the Great Falls at Paterson, receives the sewage from a population of over 550,000 people, and in addition, the waste water from many of the most important manufacturing centres in the country. The result of this pollution has been the creation and continuance of a notorious nuisance. The whole volume of water in the river bed between Paterson and Newark, at periods of low natural flow, containing a larger proportion of sewage than the proportion existing in the Chicago river before the construction of the drainage canal.

This condition of affairs has already almost entirely destroyed the value for residence purposes of all the lands adjacent to the stream, and seriously affected or menaced the health of a large proportion of the population of the very municipalities which contribute to the pollution. The nuisance is increasing yearly, the territory being within the metropolitan area, and growing in population at an enormous ratio. This same growth entails a larger draft upon the watersheds of the upper river for water supply, which in the case of nearly all the municipalities affected is obtained from these sources, and a consequent reduction in the natural flow of the lower river.

To remedy this evil, the Passaic Valley Sewerage Commission, after a most exhaustive consideration of the subject, has adopted a plan which contemplates the construction of a trunk intercepting sewer from Paterson down the valley to Newark Bay, thence under the Bay, across Bergen Neck, and under the bed of New York Bay to a point of discharge into the main channel of New York Bay. This point of discharge is within the boundaries of the State of New Jersey, about one and one-half miles into the bay from the exterior line for solid filling on the New Jersey shore, and is in the westerly side of the main channel, which is here over seventy-five feet deep, and over a half mile wide. The discharge will be at a depth of at least forty feet below mean low water. This outlet is about one and one-half miles northeast of the nearest point on the Staten Island shore, and about one and three-quarter miles from the nearest point on the Brooklyn shore, and about three and one-half miles south of the Battery, New York.

The outfall, as proposed, is to have a capacity for discharging 120,000,000 gallons in twenty-four hours. But the works contemplate an ultimate capacity of 326,000,000 gallons, and a population to be served of 1,500,000 people. All rainwater, except the first flow of street washings in a storm, and all ground waters, as far as possible, are to be excluded from the sewer. The plan also involves raising the sewage by pumps, thus incidentally breaking up the solids; and also silt catchers to retain heavy or inorganic matter, and screens to hold back and break up any floating solid matter, and prevent it being carried into the outlet.

In order to intelligently study this question, it is necessary to fix a standard strength for sewage. This may be taken at the average water consumption per head of the communities tributary to the system, or say 100 gallons. The sewer has been designed to carry 217 gallons per head of population, but this includes a proportion of rainwater, and also a certain amount of ground water, which it is impracticable to prevent reaching the sewer. Experiments and experience have shown that in the average untreated sewage of Eastern American cities this 100 gallons per head will contain about one part in a thousand of organic matter and about the same proportion of inorganic matter, or a little less than one pound of organic matter to each person per day, this including house drainage and a proportionate amount of the organic matter from street washings, and the discharge from industrial establishments. Any increase in liquid tends to reduce the proportionate amount of organic matter and the strength of the sewage.

Accepting for computation the standard sewage basis of 100 gallons per head, there is now discharged into the upper New York bay and the Hudson and East rivers from the city of New York, including the Long Island boroughs, and from the municipalities of Hudson county, about 450,000,000 gallons of sewage per day. It must also not be forgotten that all the sewage of the Passaic valley now eventually reaches New York bay by way of the Kill von Kull. All of this sewage is now discharged either into the comparatively sluggish water at the bulkheads or, at best, from the ends of the piers into the edge of the channel current. All the sewers discharge between the planes of mean high and low water, or very little below low water. No attempt is made in any case to screen or break up the solids, or to hold back silt or heavy matter. Rags, paper, offal from the markets, bodies of small animals, staves, sticks—in fact, anything small enough to pass the wide opening of a sewer basin and trap reaches the sewers and is carried into the rivers.

In the consideration of this subject it must be remembered that a discharge into a tidal estuary of the magnitude and character of New York bay, open to the free movement and influx of the salt water of the ocean, presents an entirely different proposition from the discharge of sewage into a fresh-water stream subject to wide variation of low water and freshet flow, and to be used for potable purposes; and the limitation as to safe allowable proportion of sewage to the volume of flow can be much more freely applied.

The final disposal of sewage delivered in New York bay is accomplished by a number of influences.

1st. Dilution by salt water; 2d. Chemical action, viz.: (*a*) The oxygenation of the organic constituents by the dissolved oxygen in the water, and bacterial action; (*b*) The precipitation of certain constituents of the sewage by the salts contained in the sea water; 3d. The consumption of the organic matter in the sewage, as food, by the marine life with which the water teems, and also by bacterial action; 4th. Transportation from the points of discharge into the ocean by the tidal currents.

As to the measure of dilution? The tidal estuary of New York bay, inside the Narrows, including the Hudson river, to 140th street, and the East river to Hell Gate, but excluding the Kill von Kull, has an area of about 30.5 square miles. The average depth of the bay, at low water, is about 26 feet; of the East river, about 38 feet; and of the Hudson, about 31 feet. This basin, up to the plane of mean high water, will contain about 29,000,000,000 cubic feet. The ebb discharge, through the Narrows, each tide, as computed by the United States Coast Survey (report of 1886, p. 36), was, in the month of June, 1886, after the spring freshet flow had ceased, 13,820,000,000 cubic feet, or in twenty-four hours, twice this quantity, or 27,640,000,000 cubic feet.

Thus it will be seen that each day there is a discharge from the upper bay of New York into the great expanse of the lower bay and the ocean a volume of water equal to the total cubical contents of the

upper bay and the two rivers south of 140th street and Hell Gate. That is, a volume of water practically equal to all the water contained in this great basin, from the bottom up to high water level, moves out to sea each twenty-four hours. Into this great basin, containing 29,000,000,000 cubic feet of water, changed and refreshed daily, there is discharged every day sewage from New York city and Hudson county, N. J., amounting to about 450,000,000 gallons, or 60,000,000 cubic feet. That is, for each part of sewage water we have 483 parts of river and bay water, or each pound of organic matter will be diluted with 48,300 gallons of sea and river water. This comparison eliminates from consideration any reduction of the organic constituents by chemical influences or the action of micro-organisms.

The second and third agencies tending to dispose of the sewage are chemical action and the action of micro-organisms and bacterial life. The amount of dissolved oxygen still remaining in the water, and the amount of oxygen absorbed, are very good measures, the first, of the capacity of the water to take care of and dispose of organic impurities, with the help of bacteria, by converting them into nitrates and nitrites, and the second, of the proportion of such pollution by the quantity of oxygen required to bring about the conversion.

The writer is under obligation to Dr. George E. McLaughlin, of Jersey City, for analyses of several samples of water collected from the Hudson river and New York bay for the purposes of this paper. A sample was taken at ebb tide immediately at the mouth of the Thirteenth street sewers, Jersey City, in October last. These sewers, one of five feet six inches, the other five feet diameter, serve a territory containing about 75,000 people. The outlets are at the head of a slip between two closely piled piers extending 1,100 feet into the river, consequently the current at all times is sluggish.

At the same time a sample was taken at the outer end of the down-stream pier, 1,100 feet into the river, and at the edge of the current. Both samples were of water within one foot of the surface. These samples showed—

Oxygen consumed, parts in 100,000, first sample, 11.12; second sample, 5.80.

C. c. of oxygen dissolved per litre, first sample, 1.24; second sample, 5.68.

Per cent. of dissolved oxygen to that of a normal standard of 7 c. c. per litre, first sample, 1.77; second sample, 81.1.

Nitrates, first sample, none; second sample, none.

Nitrites, first sample, trace; second sample, .0425 parts per 100,000.

This indicates a remarkable diminution in the organic constituents of the sewage between the point of discharge and the pier line, 1,100 feet out. Of course, the outer sample was taken from water already polluted with the discharge of other sewers, up stream in Jersey City and all the the sewage of Hoboken and North Hudson, or from a population of over 125,000 people.

The waters of the river and bay swarm with a multitude of forms of marine life, from the lower micro-organisms, up to the shrimp and

small fish, and a microscopic examination of the water at the mouth of the same sewer above referred to, showed that at every atom of organic sewage some of the varieties of scavengers were busily engaged in breaking up and devouring it. Microscopic examinations made of water 500 feet, and 1,100 feet, from the mouth of the sewer, showed a proportionately greater reduction in micro-organisms and particles of organic matter.

In November last samples of water were taken from the channel of the Hudson and the bay, one hour after beginning of the ebb, as follows: Sample one, middle of the Hudson, opposite Battery; sample two, bay channel, opposite Liberty statue; sample three, bay channel, opposite proposed point of discharge of Passaic sewer. As analyzed by Dr. McLaughlin, these showed:

Oxygen consumed, parts per 100,000, sample one, 6.36; sample two, 5.32, sample three, 5.20.

C. c. of Oxygen dissolved per litre, sample one, 6.28; sample two, 6.63; sample three, 6.20.

Per cent. of dissolved oxygen to that of a normal standard of 7 c. c. per litre, sample one, 89.7; sample two, 94.7; sample three, 88.5. For several weeks before the date on which these samples were collected, there had been no rains of any account on the Hudson watershed.

In the report of Messrs. Burr, Hering and Freeman, commission on additional water supply for the city of New York, November 30th, 1903, will be found, on page 520, a series of analyses of water in the Hudson river and New York bay.

Thus the ebb tide of February 26th, 1903, shows in parts per million at following points: No. 1, in lower bay opposite Sandy Hook light; No. 2, opposite Robins Reef light, New York Harbor; No. 3, at Battery, Hudson river; No. 4, opposite 30th street, Hudson river.

	No. 1	*No. 2*	*No. 3*	*No. 4*
Chloride,	14,700	11,225	9,800	7,200
Albuminoid ammonia,	0.108	0.140	0.152	0.164
Free ammonia,	0.052	0.084	0.124	0.168
Per cent. of fresh water,	21	39	47	61

At the flood tide of February 27th the showing for samples from the first three points was:

	No. 1	*No. 2*	*No. 3*
Chloride,	15,300	11,225	8,150
Albuminoid ammonia,	0.108	0.260	0.180
Free ammonia,	0.072	0.170	0.144
Per cent. of fresh water,	17	39	56

On page 500, same report, is given an analysis of Croton water at 135th street gate-house. This shows parts per million: albuminoid ammonia, 0.157; free ammonia, 0.032.

On page 552, is given an analysis of Hudson river water at Poughkeepsie, February, 1903, which shows parts per million: albuminoid ammonia, 0.128; free ammonia, 0.020.

On page 558 is given analyses of raw Hudson river water at Albany filter plant, which show average for years ending September 30th, 1900, 1901 and 1902:

	1900	*1901*	*1902*
Albuminoid ammonia,	0.341	0.231	0.266
Free ammonia,	0.121	0.115	0.096
Oxygen consumed,	5.00	6.08	5.51

These analyses show that the water in the channel of the Hudson river and New York bay, though polluted by the discharge of the sewage of about 4,500,000 people, is so affected by the remedial agencies of enormous dilution, oxygenation, micro-organisms, and bacterial action, as to be, as far as can be determined by the ammonia present, and the oxygen consumed, purer than the raw river water at Albany, and nearly as pure as the Croton at the gate-house at 135th street, and the Hudson at Poughkeepsie, where it has been proposed to secure a pumped and filtered supply for New York.

In addition to these agencies of purification, the calcium and magnesium salts existing in sea water act to decompose and precipitate the soluble soaps in the sewage, in the form of soap curds, which are carried to the bottom. This action in a shallow channel, or in still water along the bulkhead, has, at times, caused inconvenience, but in the outfall selected for the proposed sewer, the depth, 75 feet, is so great as to do away with any danger from shoaling.

TRANSPORTATION TO THE OCEAN BY TIDAL CURRENTS.

The tidal movement in the bay of New York, and through the Narrows, is peculiarly advantageous for the final disposal of all sewage constituents remaining in the water after the action of the remedial agencies before discussed. The ebb flow through the Narrows, as before mentioned, is 13,819,895,144 cubic feet. The flood flow is 12,703,616,418 cubic feet, the excess of ebb being 1,116,278,663 cubic feet. The cross section of the Narrows is 271,480 square feet. The mean velocity of the ebb would thus be 1.61 miles per hour, and of the flood 1.48 miles per hour. The maximum velocity in the channel at ebb tide, as measured under the direction of General Newton, U. S. Engineer, in 1872, was 4.5 miles per hour.

The excess of ebb flow of the Hudson at Thirty-ninth street is given by the U. S. Coast Survey (report 1886, p. 36) as 770,692,868 cubic feet. This measurement was made in June, and the excess of ebb flow indicates an average discharge of 1.15 cubic feet per second per square mile of drainage area. This volume of discharge will be exceeded for seven months in an average year. In fact, for a great many days in

every year, the river runs ebb for twenty-four hours, opposite Courtland street. The ebb current in the channel is a true, strong current, directly through the Narrows, and straight through the main ship channel to the Southwest Spit, then turns to the east, and passing the point of Sandy Hook to the ocean. As a usual thing, the ebb current in tidal waters is concentrated and the flood diffused. This action forms and keeps the channel deep and open. Where it is not the case, as in wide-mouth bays, there is seldom a well defined channel. The peculiar configuration of New York bay, with its broad estuaries, and the Hudson and East river, and the concentration of flow at the Narrows, makes this action of the tides very marked.

The ebb flow in the channel has a velocity of two or three miles per hour, and any floating substance deposited in it opposite Robin's Reef, at the beginning of the ebb, will be carried outside Sandy Hook before the next flood. The ebb in the main channel always continues for an hour or more after the turn of the tide, and much longer at periods of large fresh-water flow in the river. At the turn of the tide, the first of the flood waters run westward along the Rockaway and Coney Island shore, rounding the point of Coney Island, and hugging the east shore through the Narrows, while the water in the channel is still running strongly outward, and the surface is rising. After a while, there is a cross-channel movement, which spreads up westward into Raritan bay (the main channel still running ebb), and runs north along Staten Island into the upper bay, and south along the Jersey shore into Sandy Hook bay, and crossing, then sets north along the back of Sandy Hook, meeting and helping to stop the ebb in the main channel at Southwest Spit. The flood tide then begins to be felt in the main channel, but is never as strong or as concentrated as the ebb.

Thus a most favorable condition exists for the final disposal of sewage after once passing the Narrows. The first hour, or hour and a half of flood is pure ocean water from the tidal wave which sweeps up the coast and infringes on the Rockaway shore. The flood is diffused, and sewage, instead of going back through the Narrows, is spread out and diluted in the great volume of Raritan and Sandy Hook bays. The proportion of sewage discharged into the bay as before considered, is only the present discharge from New York City and Hudson county, and we have seen what a small effect it seems to have on the waters of the bay in the channel at the prosposed point of outfall for the Passaic sewer.

It is true that this discharge of raw, unscreened sewage at the heads of slips and at bulkheads, or over beaches, or shoals near shore, does, in many instances along the river front, create a local nuisance, but there is no case in which this nuisance is at all noticeable where the sewers have been continued to the outer ends of piers and discharge below the surface into the deep water at the edge of the channel.

As has been said before, all the Passaic sewage now reaches New York bay through the Kill von Kull, having indeed been subject to

considerable bacterial action in the river and Newark bay. This sewage under the proposed plan will have a daily volume of standard strength of about 7,300,000 cubic feet, or one-ninth of the present pollution from the city of New York and Hudson county. It will be screened, and all floating matter and all heavy matter removed before discharge. The outlet will be at least 40 feet below the surface; thus the diffusion through a large body of sea water will be obtained before it reaches the surface. It will be discharged into the most rapid current of the harbor, into a channel seventy-five feet deep and within three miles of the Narrows and final disposal.

The water at the point of discharge, is now practically as pure as the waters of the Hudson at Poughkeepsie and Albany, and the amount of dissolved oxygen is sufficient to care for and render innocuous a much greater proportion of organic matter than will be contained in the sewage. The discharge being in the main channel and the current being true up and down the middle of the bay and river, it will be practically impossible for any part of the sewage ever reaching the shores. On the ebb tide it will reach the Narrows in an hour, and at flood will remain in the centre of the river until it is met by the next ebb.

For all these reasons there does not seem to be any hygienic objection to the proposed discharge of the sewage of the Passaic valley intop New York bay. In fact, the proposed plan is in the line of the most enlightened progress in sanitary sewage disposal, and far in advance of the practice prevailing in all the territory now draining into the bay.

School Inspection.

By Joseph Tomlinson, M.D., of Bridgeton, N. J.

The subject of my paper, as it appears upon the program, does not convey an exact impression of what I wish to discuss at this time. It is my wish to say something of the compulsory medical inspection of schools and its relation to the introduction into the public schools of a department of physical education.

The health and physical condition of school children receive far more consideration than formerly. There are many reasons why this is true. More attention is paid, in recent times, to matters of hygiene in general. School buildings share with other modern structures the benefit of the progress made in heating, lighting, ventilation, lavatories, etc. The necessity of prophylaxis and isolation in communicable diseases is more

thoroughly appreciated than it used to be. In large cities the tenement-house evil fills the schools with puny children whose need is, plainly, air, food and exercise, quite as much as mental pabulum. Many occupations, by reason of the substitution of improved machinery for hand labor, are no longer available as a source of muscular education for boys.

All these are reasons why the school child of to-day receives more attention than formerly as to his physical well-being. Beside all these, there is still another, and, I think, perhaps a more potent reason than them all. It is beginning to dawn upon the community that the very environments and methods of our present educational system are, in no small degree, responsible not only for many physical defects but also for a lack of proper physical development during the formative period of life. The cramming system, the attempt to do too much in too short a time, is each year claiming more victims. School inspection has done and is doing much to better the hygienic condition of school-houses and of pupils. It has done and is doing much to prevent the spread of communicable diseases, and to detect and remedy troubles of eye, ear and throat. In spite of criticism and some disappointing results it is undoubtedly a move in the right direction. It is the method and not the principle which is open to criticism. To be fully effective, it must be first general, second thorough.

School inspection in this State is entirely optional with local boards of education. These boards are also authorized to fix the salary and define the duties of the medical inspector. In order to effect a general school inspection throughout the State it must be compulsory rather than optional, and in order to be thorough it must be done by a competent physician receiving adequate compensation for thorough and painstaking work. Some uniform standard of requirements and of methods to be followed by all school inspectors would also be an assurance of better service. But after school inspection has done all which properly belongs to its sphere in detecting and preventing disease, it has only accomplished part of what should be done for the physical welfare of the pupils of the public schools. They should be taught something of practical hygiene and should receive, as part of their public school education, such exercises as would insure normal bodily development.

The duty of the individual to care for the body should be early impressed upon the child and at the same time he should be given a practical idea of how to accomplish this. The love of life is a God-given instinct and the preservation of health is a sacred duty. If the principle of personal hygiene were more fully appreciated as a duty, and if it were more fully lived up to, the standard of individual morality would be greatly elevated. If the evils arising from uncleanliness, from the disregard of the laws of health in eating and drinking, and the neglect of sexual hygiene could be eliminated, there would be little lacking in the enforcement of the moral code. Bodily health in the fullest and strictest sense bears a very intimate relation to moral integrity. The interdependence of mind and body, as expressed in the old adage, "Mens sana in corpore sano," is, I think, accepted without a challenge.

When, therefore, so much depends upon the understanding and application of the laws of hygiene, why should they not be taught, practically and explicitly, at the very time in life when they are most essential? Why should there not be in all the public schools of this State a department of physical education? I would define physical education, in this connection, as the department of instruction which aims to develop, strengthen and discipline the body, by directed, systematic exercise, and to secure and maintain good health through practical knowledge of the laws of hygiene.

Hygiene is applied physiology. Only by a strict interpretation of this term and unwavering adherence to it, can any real or lasting results be obtained in this field. Fads in physical exercise and gymnastics come and go. But we must build on a more secure foundation than a passing fancy. Our whole aim should be to have taught as fully as possible the chief function of every organ or set of organs in the human economy and how to assist in the performance of such functions. It is not to make athletes on the one hand or to cure disease or deformity on the other that we would urge the introduction of such a department but to secure proper growth and development based on some knowledge of physiology and anatomy.

The need of such a department is urged by many educators. At a meeting of the Educational Section of the International Congress of Arts and Science, Dr. William H. Maxwell, Superintendent of the Public Schools of New York City, made an address in which he observed that no school was doing adequate work without physical culture in the form of play, gymnastics, athletics and manual training.

In a personal letter to a friend of mine, on this subject, the school superintendent of one of the largest cities in this State says: "I take the ground that educational theory universally accords supremacy to the physical side of education wherever it conflicts with the intellectual side; that because of our almost universal apotheosis of training in the three R's we neglect most shamefully considerations of health and growth. As proof of the supreme importance in my mind of the physical side of education I would personally be willing to have a health officer as a ranking officer to the city superintendent, with plenary powers as to all matters relating to the construction, adaptation to school requirements, sanitation and hygiene of school buildings and all connected therewith. He should have all the powers that are accorded to health boards in respect to contagious diseases."

Physical education, as I have defined it, involves, necessarily, some instruction in anatomy and such practical knowledge of organic function or physiology as bears upon the ordinary health conditions. To attempt to teach anatomy except in a very general way is, of course, impossible and out of place in the public school. But the functions of organs and the various means at hand to assist and preserve these functions can be taught more fully and explicitly. For instance, in the muscular system it could not be expected that the names of muscles, except perhaps a few, be memorized. But their groupings and their

actions could, in a general way, be taught. It should be shown to the pupil that the uses of the muscles are for posture, as standing, sitting and assuming various attitudes for motion, which would include locomotion, which again would include running, walking and swimming.

All these uses of the muscles, though so common, are very faulty. For instance, the prevailing awkwardness of the country lad and lass is not a necessity. It is largely due to lack of discipline and control. The physical embarrassment which comes to any rapidly growing youth need not exist if he is receiving proper physical training. The erect carriage and manly bearing of the soldier could be made the accomplishment of every school boy. The grace and physical control characteristic of the girl of refined bearing could be made the accomplishment of every school girl. Besides being taught how to walk and run, and stand and sit, school children should be taught to swim. This is a matter of utility quite as much as one of exercise and sport. The importance of this subject can be realized when it is known that eighty per cent. of public school children are unable to swim; that is to say, that of every five thrown into deep water, four would drown. In the frightful "General Slocum" steamboat disaster, last summer, more than a thousand persons, hundreds of them children, lost their lives, because unable to swim. This and other drowning accidents in lakes and at the seashore have incited several cities to teach swimming in the public schools, either in tanks or by means of swimming exercises.

I have taken the muscular system as an example of how the theory and practice of proper function can be taught, both because of the importance of the muscles and also because in training them other organs are indirectly brought into activity, as the heart and circulatory system, the lungs, the sight and hearing. The applied physiology of all the organs should be taught in a similar manner. I am aware of the fact that in many public schools throughout the country, physical exercise and physical education is being efficiently taught. Wherever it has been introduced the results have been, I think, most gratifying.

Henry R. Edmunds, President of the Board of Education of Philadelphia, says: "All the children have been much benefited since we introduced class-room calisthenics and setting-up drills, and arranged for them to have some exercise in the open air during the day. Headache, which used frequently to interfere seriously with work in the class-rooms, has almost entirely disappeared. What improves a child's health is pretty certain to improve the chance of his turning out a good citizen. And swimming, cleanest and most exhilarating of exercise, is needed most of all. Until the schools are able to attend to this duty it devolves upon the parents, and it is one that they should not neglect."

A general and systematic medical inspection of schools supplemented by a department of physical education would insure to the youth of our land a priceless boon. This can only be effected by legislation to this end. A bill with this object in view will probably be introduced at the next session of the Legislature of this State. Two objections are likely to be raised against it: first, the expense involved; second, that it will

take too much of the pupils time from study. To the first objection my answer is that the results to be obtained justify the expense. An answer to the second objection involves a consideration of the real aim of public school education.

If, as seems to be the prevailing impression at present, the public schools are to be stuffing machines to fill the young brain full of dry facts and technicalities, physical education has no place. If, on the other hand, their object is to help the young child to grow mentally, to develop and acquire mental power and vigor, if quality of work rather than quantity of work is to be the standard, if a normal co-relation between mind and body is a desideratum, if, in short, we wish to graduate from our schaals well-rounded men and women, then it is our duty to give due regard to their physical education. It was James Russell Lowell who said: "It was in making education not only common to all, but in some sense compulsory on all, that the destiny of the free republic of America was practically settled." The schools determine, more than anything else, the character of our citizens and our country.

I realize that I have treated a very broad and important subject quite imperfectly and superficially. It has been my aim to suggest rather than to attempt any exhaustive discussion. But I am deeply impressed with the necessity of a more practical and more perfect method of instruction of school children as to the laws of their being, that there may be instilled within them a full appreciation of the sacredness of life and health, and a dutiful desire to prolong the one and preserve the other.

Can Outbreaks of Measles be Controlled?

By Thomas N. Gray, M. D., of East Orange.

This query assumes that such outbreaks are not controlled, and further warrants the inference that there is an element of danger in the non-control. How widespread and frequent? What is the necessity for control? Why not controlled? How may we gain control, if it can be gained? These are the questions involved in the topic which I shall discuss.

No exact data can be obtained in this State of the extent and frequency of measles epidemics. An extensive correspondence, however, tells the story of measles endemic in nearly every part of the State every year, and at intervals evidently covering the time necessary for available material to accumulate, and the occasion when this material

will get in the line of attack, breaking out into an epidemic. Available material seems to be a sufficient number of children, virgin to the poison, arriving at the school age. In the line of attack undoubtedly is the gathering together of this material in the day and Sunday-schools. Supplement those two premises with the facts that the morbific principle of measles is very tenacious of life and the most active of any of the eruptive diseases, and that the susceptibility to it is more general than to any of the others, and no wonder will exist that if there is no control, and no attempt to get it, it does and will continue to occur epidemically at fairly regular intervals. That there is no control, the State Board of Health emphasizes in its 1897 report, when it says: "Measles thus far has baffled all attempts to prevent its frequent re-appearance as an epidemic," and again, in 1900, says, "Measles continues to re-appear in the various sanitary districts of the State with much regularity, almost every locality experiencing an outbreak of this disease every fourth or fifth year." In 1894 an honored ex-president of this Association, Dr. John L. Leal, in a paper read before it on "Restriction and Prevention of Communicable Diseases of Childhood," drew a graphic picture of the unrestricted occurrence of scarlet fever and diphtheria, and regretted the lack of success in the efforts to restrain them, giving the non-support of public opinion as a prime cause of the failure, and made a strong plea for the education of the public to the danger, and the use of all the preventive measures on the part of sanitarians. Incidentally he referred to measles as worthy of some attention at the hands of health boards. To-day, not regret, but the satisfaction of an earnest worker is his, from the knowledge that public opinion has been educated and that sanitarians now meet an outbreak of either of these diseases with promptness and effectiveness. Measles, however, continues to come as it will, the public now, as in 1894, being unaroused and science standing aloof.

Is there no danger in this never-ending repetition of measles epidemics? or has this disease a serious aspect of which the public is ignorant or careless, and which should arouse those engaged in the work of preventing disease to the most determined effort?

The history of measles is a dark one, old writers giving it a record which shows it to have once possessed an intense virulence. Happily in this day this extreme virulence is seldom seen, either because of its lessened power or because a relative immunity toward it has been acquired by successive generations through the actual immunity gained by previous generations, or for both reasons. But though weakened in virility, or meeting a partial immunity, measles has not wholly lost its power to kill, the State Board placing the fatalities from it at an average of 160 a year for a number of years, and in the year 1900 it was responsible for over 12,000 deaths in the United States; over twice as many as scarlet fever carried off. Some may advance the argument that measles caused more deaths in that year than scarlet fever because of a greater number of cases of the former than of the latter. Rather would this be an argument for the necessity of control. But

these figures do not tell all the story of measles and its inroads on child life. No disease of childhood is attended with so serious complications, not sequelæ, but exaggerations or extensions of the lesions produced by the specific poison. Chief among them capillary bronchitis and broncho-pneumonia, magnified in their intensity because induced by and in conjunction with a poison, and consequently more frequently fatal than when occurring under ordinary circumstances uncomplicated with another disease. The fatalities from these complicating diseases should figure in the mortality of measles since occasioned by its poison. Nor does the effect of this poison stop here, for it is one of the most important of factors in preparing the way for tuberculous infection. Osler says, "The complications and sequelæ combine to make it a very fatal affection in children." Surely if we have succeeded by sanitary measures and strict isolation and quarantine in lowering the mortality rate of scarlet fever, or if by these same means and by the addition of antitoxin to the armamentarium of the physician, have robbed diphtheria of its terrors, the swath which measles cuts is wide enough to incite us to some systematic and scientific effort to at least restrain it.

The facts established that measles outbreaks are both frequent and extensive, and that the mortality rate from them demands control, the solution of the question as to the possibility of curtailing these epidemics rests largely on the causes of the present inaction. The character of the poison, present from the beginning coryza and continuing through the whole course of the disease to the final desquamation of the powder-fine skin, is one cause. The attitude of the laity, holding measles in low esteem, is another. Mortifying as it is to say it, the attitude of many physicians who also hold it in contempt is partly causative. Finally, the attitude of sanitarians must be counted in the same category. Because the State does not include it among communicable diseases but very few localities require it to be reported. In the majority of places where a report is required, a notification of the schools ends the board's connection with it. In others a quarantine, but very inefficient, is maintained, and again in the localities where an earnest effort is made to arrest the progress of an epidemic, the board is handicapped on the one hand by the failure of physicians to report, on the other by parents failing to call in a physician, and allowing the unaffected children free entrance to the contaminated room and unrestricted contact with other children on the street and in various public places. The failure of physicians to do their part, or of sanitarians who make no effort to interfere with the course of an outbreak or to throttle the disease when endemic, is unaccountable. Is it that we have held the disease as of no importance? The facts about the seriousness of measles are common knowledge, or ought to be. Or is it, especially on the part of sanitarians, that having met defeat in former attempts to control this elusive, insinuating, unrecognizable poison we have given up, laid down, and allowed it "free lance"? The 1896 report of the State Board of Health, after reciting the lack of

early recognition of the first cases and the always rapid spread of an epidemic, says: "To apply isolation restrictions under these circumstances does no good." What would the public say, what excuse could we make, if we took this position when the first cases of scarlet fever or diphtheria had escaped recognition and detection and the epidemic was well under way when discovered? Would we dare say, "this is too hard for us"? The true animus of science should be to direct its efforts against every form of infection or contagion, no matter how hard the proposition.

While the history of attempts to stop epidemics of measles is at first sight one of failure, who can say, in a given epidemic where an earnest effort has been made to check it, how many escaped, who, if no effort had been made, would not have done so? We can tell the number attacked. Rarely has the opportunity been given to know the number of susceptible unattacked, no matter what the contagion. Undoubtedly the wonderful activity of this poison and the susceptibility to it of such a great percentage of the un-immunized, make it the most difficult of all contagions to contend with. For these reasons, if for no other, the first step in an effort to gain control should be its admission to the list of communicable diseases. It seems somewhat farcical to read on the list of reportable diseases given out by a locality far removed from railroad and seaport, "the plague, cholera and yellow fever," with no mention of measles, which eats and sleeps with it. Especially should measles be made reportable by the fact, recognized by physicians, that certain people will take medicine when they will not take advice, and consequently an injunction given them to keep the unaffected children off the street and out of school is disregarded. These same people *do* have a wholesome regard for the Board of Health, and an order from it would be obeyed.

The declaration by the State Board of Health that "Primary cases should be dealt with as energetically as smallpox," is axiomatic. The failure to detect the primary case is responsible for the failure of efforts to prevent an outbreak only. Make the disease reportable and fine every physician and parent who can be convicted of non-report. Make them have respect for the fine if they have none for the disease. Make them suffer in pocket if they help to make the community suffer. Perhaps this will lead in time to the early recognition and so to the discovery of the primary case and the prevention of an epidemic. But if the first case continues undiscoverable, the duty of the sanitarian is no less. His effort to control an outbreak should be just as great as to prevent one. Isolation, quarantine and disinfection cannot fail to do some good. Fifty years ago Sir Thomas Watson, in giving the history of an outbreak of measles in the Faroe Islands, said, "Isolation was the only sure defense against the disease, 1,500 persons escaping it by establishing regulations equivalent to quarantine." This was one of the few opportunities given for estimating the number saved from a contagion. If the same strict isolation and quarantine was established over every case of measles discovered as is over the other communicable

diseases, and every unaffected child confined to the limits of yard, house or rooms, with the same notification of day and Sunday schools and public libraries, and the same disinfection and destruction of books, papers and toys, then no spread of the disease would come from the places so treated. The cases undiscovered through the fault of parent or physician hold no responsibility for the sanitarian, but those which are known hold a large one. Not alone on the health boards does the responsibility rest. The board of education has its share. Let it have a sufficient number of medical School Inspectors to insure a daily visit to every school. Perhaps there will be recognized and discovered the primary case in school; discovered, too, when but a half hour of exposure has been given; not as now, after three or four days of coryza and lachrymation. It is a significant fact, in this connection, that in a number of instances epidemics have been broken up by the closing of the school. School-rooms should also be fumigated at regular intervals, this as against all contagions.

Finally let the municipal authorities build the isolation hospital and quarantine station; then, when health and educational boards join hands, may we indulge the hope that outbreaks may be curtailed, if not controlled and possibly prevented, by the discovery of the primary case in the years when the disease is endemic only off guard, giving opportunity to science.

Contagious Diseases and Schcol Attendance.

By Gordon K. Dickinson, M. D., of Jersey City.

The one duty of each municipality throughout the United States, from which there is never any dissension, is the education of the children. Not only are inducements made which attract the majority, but in some localities the law compels all children between certain ages to attend school. Our problem is, do we properly guard the child and do we give him the maximum number of days attendance possible?

The conditions of crowding and promiscuity of classes being often most unsanitary, contagious diseases are liable to be disseminated. On both the boards—of education and of health—fall the responsibility of solving this problem and bringing down to a minimum the danger of infection and at the same time taking up to its maximum the days of attendance.

In Jersey City during the year 1903, according to the State Superintendent's report, there were 31,367 days of quarantine, and in the whole State 90,864. This specific quarantine does not include the isola-

tion of the sick. This problem is a serious one, and it is the duty of sanitarians, in co-operation with boards of education, to control; it is a matter requiring both good judgment and expert knowledge of sanitation. Reliance has been for the most part put in notions of methods of contagion held for years like a fiction. If these are correct, then we have but to accept the same result repeated, but if it can be shown that our opinions have not sufficient foundation then we can probably reduce these enormous figures.

In the evolution of sanitary science its application as an art was necessarily crude. Stress was laid on the importance of conditions now known to be harmless or nearly so; the air was blamed for mias-now known to be harmless or nearly so; the air was blamed for miasms, sewer gas for various diseases, upturned earth for malaria and of loathsome and fatal diseases, that quarantine was excessive and disturbing, and that the personal liberty of many and general commerce were sacrificed? The lack of confidence in the medical profession, heightened by the superstitions prevailing, made the quarantine more exacting.

Medical knowledge comes slowly and is accepted with timidity and the action of disease-laden air and the carrying by fomities have been recited for many years. Like all half truths, enough can be said for these conditions to keep them as active factors before the profession, but to careful observers there has been a suspicion that their values have been much overestimated and even that their effect may be counted as slight. It will take years of patient work on the part of qualified and painstaking observers to prove the new ground and to convince the profession that the danger lies in different channels.

For practical purposes we will consider diphtheria and scarlet fever only. Measles is our more contagious disease, but as the danger exists before the eruption appears, it cannot be treated with the others. Diphtheria having no local expression, other than in the naso-pharynx, must needs be of risk only by the secretions from these parts. The infection cannot be disseminated by any other means than the discharge of spittle or globules from the breath. Scarlet fever, besides having the same local expression, presents a rash which, according to some, contains the cause of the disease and may be a potent means of dissemination.

Until we have some sure method of separating the germ which produces the disease, we cannot prove the assertion. On the observation of many cases running over a period of many years, must be our dependence. And then as our knowledge enlarges, must we readjust our hypotheses. For we must both carefully isolate the patient and destroy or disinfect all articles which come in contact with the said discharges.

Throughout the States there is a great diversity of opinion as to the best method of preventing the spread of these diseases, particularly among school children. To an outsider it seems inconsistent to keep from the schools children living under the same roof but not

within the same family, and at the same time allowing them and all others to circulate freely in all other public places. What protection may be given the school children by keeping them from the schools is nullified by the contact with suspects and the incompletely cured outside. A proper examination of "return" cases would help greatly in solving the potential value of the present plan. In communities where there are hospitals for these diseases, it often becomes necessary to discharge the convalescent before the regulation time, in order to accept new cases, yet with no increase in number of "return" cases. If desquamation were so important a factor in the spread, the contrary would be the case.

Lauder has recently published in the "Lancet" a most able and convincing article reciting his experiments in the Hospital of Contagious Diseases at Southampton. His plan is to separate the acute cases from the convalescent, that the latter might not be in the zone of active infection. And further, he separates the ones suffering from discharges from the respiratory tract from the others. His experience was, in brief, that by so doing he brought the time in hospital down from 48 to 34 days, and with no increase of "return" cases.

The argument is that the danger from these contagious diseases of childhood, which interfere with school attendance, is mainly if not entirely through the moist discharges of the respiratory tract. If this be true, their sanitation is a much simpler matter than if the desquamation and the air are suspected. Let the patient be isolated and have the usual disinfection of articles which may be infected by discharges from the mouth, nose and ear.

Do not allow intermingling until evidence, both clinical and laboratory, prove entire recuperation. Other members of the immediate family and those who live with them should be regularly inspected, so that a fresh case may be discovered in its initial stage. If this plan can be intelligently carried out, both by physician and family, it will not be necessary to quarantine those who live in the same building. An accurate tally should be kept of all such cases by either the department of education or of health, or both, and if the "return" cases increase, showing laxity on the part of the attendants, then the more rigid quarantine should be enforced.

Abstract of a Paper on Milk.

By John O. George, D. V. S., of Camden, N. J.

Public interest in the quality of milk is increasing, and physician sanitarians, milk consumers and progressive milk producers apprecia more and more that there is the greatest difference in the quality ai

wholesomeness of the milk sold in our towns and cities, and that it is very necessary that this article of food be always pure and wholesome. In some cities a supply of good milk is almost an impossibility, in other cities milk of the best quality is sold only in limited quantities. The reasons for securing an abundant supply of pure milk are so many and so important that the public should be especially interested in this subject, and should assist in bringing about an improvement. There is often a long interval from the time when the milk is taken from the cow to the time when the milk is served at the breakfast table.

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Vital statistics show that about one-third of all deaths are of infants, and that a very large percentage of these die from diseases of the digestive tract. These diseases are due principally to impure food; it is, therefore, reasonable to assert that the mortality of infants has a close relationship to the wholesomeness of the milk supply. In certain districts where earnest efforts have been made to improve the milk supply. the mortality of infants has been much reduced. Outbreaks of disease have been definitely traced to infected milk. Among the most common diseases carried in this way are typhoid fever, diphtheria and scarlatina. There is little doubt that tuberculosis is also spread by infected milk. Derangement of the digestive tract may be caused by the comparatively harmless bacteria which are ordinarily found in milk, being present in exceptionally large numbers. The quality of milk cannot easily be detected by its appearance, and it is doubtful if any article of food can be adulterated or contaminated without changing its appearance to such an extent as is possible with milk, and it is not an easy matter to judge the quality of milk by its color, its taste, its keeping qualities and the visible sediment. Skimmed milk having a yellowish tinge, may easily be mistaken for whole milk, and, much more important, milk of an actually dangerous character may not differ in appearance from the pure article. It may look the same whether it contains 200 or 200,000 bacteria to the cubic centimeter. Accurate tests for quickly determining the quality of milk have not yet been made so simple and cheap as to induce their general use. The proportion of fats that milk contains can be measured in a few minutes, but it is not to be expected that many householders will ever be supplied with the necessary apparatus for such tests, and pathogenic bacteria in milk can be recognized only by a trained bacteriologist. Milk, as such, is about the most unclean article of food that enters the human economy, and I have often wondered why the milk question has been so shamefully neglected, but the majority of people do not know under what conditions and in what surroundings it is produced. If you have ever seen the residue in a separator after a quantity of milk has been run through it you will surely join in the demand for clean milk. The residue looks just like pus.

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Any healthy cow fed on good wholesome food will produce good milk, but what of her surroundings? Can a cow be housed all night in an illy-ventilated stable, having no drainage and no fresh air, lying

in her own filth, and remain healthy Can a cow drink from a well situated in the barn-yard, where water percolates through the soil and is for the most part impure and unwholesome, and remain healthy? Where shall good wholesome milk come from? How about the attendants? Well, they are for the most part colored folk, and when they get up in the morning they forget to wash their hands, and they forget to clean the cow's udder before starting to milk. and while milking tobacco juice may be expectorated indiscriminately and you get some of that in your coffee, but, as they say, the city folks know no better and anything is good enough for them. Where does the milk go to when the milking is done? I have seen it taken not ten feet from where it was milked and run through a separator, while it should have been removed at least 200 feet away from the barn, where it should have been properly treated and cooled. Perhaps some of you think this picture is greatly overdrawn, but it is not. I have seen all these things and the half has not been told. Now, then, if these are facts, what is the remedy? Surely we cannot keep on using milk produced under such unfavorable circumstances. Why not begin at the root of this matter? Why not begin with the man who produces the milk? Admit that the milkman is not always blameless and that some are unscrupulous and need watching, but the law has them pretty well in hand and can deal with them. Why not say to the dairyman you must produce your milk in better surroundings, or we will not allow your milk to be brought into our city or town, as the case may be.

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If your baker had the reputation of being untidy or careless in the making of his bread and pies and you heard of it, you would surely investigate the matter, and if you found such to be the case you would eat no more of his bread, and you would do the same thing with the man who serves you with meats, but when your milk is contaminated with, you know not what, you simply are at a loss what to do. Why not exclude it from your city, until such time when the producer can show to you clearly that he is g iving you the best, the cleanest and the most wholesome milk? Great progress has been made in recent years in the production of milk and in its delivery to consumers. Producers give more attention to the selection and care of cows, their health housing, food, water, cleanliness in milking, and in the care of the milk on the farm. There has also been marked improvement in vessels and ways of shipping, but further reform is needed, and this work requires the united efforts of all public and private agencies which can be brought into action.

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PROCEEDINGS

OF THE

Thirty-first Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, December 8th and 9th

1905

IN THE

Laurel-in-the-Pines House, Lakewood, N. J.

TRENTON, N. J.
MacCrellish & Quigley, Printers.
1906

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CONTENTS.

Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers, and other citizens of our State interested in Sanitation as related to our homes, our schools and our municipalities.

Any citizen may become a member of the State Association on application to the Secretary or any member of the Executive Council, on the day of meeting. The membership fee is **two** dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of methods relating to the prevention of sickness and the promotion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise, and preventing harmful, sanitary legislation, and also to aid the State and local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health, a part of the annual meeting is devoted to such special subjects as relate to the work of local Boards of Health. Every local board should have present at the annual meeting its Health Officer, Inspector or some other active member. The information secured for the benefit of each locality far more than compensates for the slight expense.

MINUTES

OF THE

Thirty-First Annual Meeting of the New Jersey Sanitary Association,

December 8th and 9th, 1905.

OFFICERS, 1904—1905.

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Second Vice-President, ...GORDON K. DICKINSON, M.D., Jersey City
Third Vice-President, ...JOHN B. DUNCKLEE, C.E., South Orange
Secretary, ...JAMES A. EXTON, M.D., Arlington
Treasurer, ...GEORGE P. OLCOTT, C.E., East Orange
Chairman Executive Council, ...WM. G. SCHAUFFLER, M.D., Lakewood

The thirty-first annual meeting of the New Jersey Sanitary Association was called to order by the President, Norton L. Wilson, M.D., of Elizabeth, in the assembly-room of the Laurel-in-the-Pines, Lakewood, N. J., at 4.25 P. M., Friday, December 8th, 1905.

The President called upon Dr. Schauffler, of Lakewood, for a few introductory remarks.

Dr. W. G. SCHAUFFLER—As Chairman of the Executive Council it is my duty to make announcements at this time, but unfortunately the only announcements to be made come from our Secretary, and he has missed his train, therefore I am not able to give them at present. As a member of the Association and a resident of Lakewood it gives me pleasure to welcome the Association to Lakewood again. You come here every year, and I hope you enjoy your stay among us as much as Lakewood enjoys having you here. I hope we will enjoy this session as much as those in times past. We feel here in Lakewood that the Sanitary Association fills a place in the State that no other association does, and we find in talking over the matter with men of other States that it holds a unique place in all

eastern States. It is, I think, the oldest association of the kind in the country, and looked up to by associations in other States as a pattern. We have before us this year a program which is very broad, and covers an unusual variety of important topics, and we have a large number of men here much interested in the work. I congratulate you on belonging to the Association, and on having brought it to such a degree of influence among the associations of the country. We welcome you very cordially to Lakewood, and hope that your stay will be very pleasant and profitable.

THE PRESIDENT—Unfortunately, the absence of the Secretary keeps us from distributing the programs, as he has them with him; but we expect him on the next train and we will then be able to provide programs for all. The first paper on our program is entitled "Examination of Health Officers and Health Inspectors," by John L. Leal, M.D., of Paterson, N. J.

DR. LEAL—The subject which has just been announced by the President was intended for Dr. Murray, but as he was unable to attend my name was put in the place of Dr. Murray's. The subject which was given to me was the "Education and Training of Health Officers." It was not and is not my intention to give any paper on this subject. If I remember correctly I have already read three papers on it. It was the desire of the Executive Council that a round table or symposium and general discussion should be held upon this subject, and I was appointed to conduct it and secure speakers. The subject is of the utmost importance, and one of the vital questions before us to-day. As sanitary science has become more exact so the means and methods for carrying out this work and securing results must be more exact and technical, and in order that these results should be attained those in charge of the public health and sanitary work must be properly trained and educated for the purpose, not only theoretically, but technically and practically. In the furtherance of the objects for which this Association exists some years ago a bill was put through the Legislature, on the initiative of this Association and through the work of its members, which requires that all health officers, since the first of January last, appointed in this State must be examined by a board of examiners appointed by the State Board of Health. A number of examinations have been held and many

have been examined, a certain number of whom passed and a greater number, I understand, failed. It was a great step in advance, but in order to supplement results already attained another step is necessary, and that is that some proper means for not only a theoretical education, but also for the practical and technical training of the candidates for these examinations should be provided. This is the vital requirement now in this State, and a number of gentlemen have been requested to speak on this subject and I will call on them in order. Dr. Henry S. Drinker, President of Lehigh University, was expected to be present and address us, but he has been unable to come here and Prof. Hall, of that university, who will take his place, has not yet arrived, we hope to hear from him later. I will now ask Dr. Hedges, of Plainfield, to speak to us.

Dr. B. VanD. Hedges—I was asked to say a few words in regard to the training of assistants from the standpoint of the executive health officer. It seems like a self-evident proposition that the increased efficiency of the health inspector will increase the value of that work to the community. I think those who have been in touch with the matter are able to appreciate the change which has occurred in the work of health boards since the introduction of skilled and trained assistants. I can remember when I first became connected with the Board of Health in Plainfield, our annual appropriation was $300. Our health officer and inspector, who had charge of the whole work, was a man taken from the rank and file of our people who knew little about sanitary work. When reports of a contagious disease were sent to him, a card was put up in the course of four or five days from the time the report reached him, and the card was removed when the physician desired it without any authority from the Health Board. Now we have an appropriation of about $5,000 from our city, and we have in charge of the work a health officer graduated from the Boston School of Technology. We have a practical plumber who is of much value to us, and during the summer we had an assistant who was a college man. The work which is done compared with the work done twelve or fifteen years ago speaks for itself. In connection with our office we have a laboratory where the health officer makes an analysis of all milk which comes into the city from other

communities. We also look up conditions of dairies to see if they are all that they should be. If, as a result of these inspections, the milk does not come up to the average standard the milkman is refused a permit. The house to house inspection during the summer has been of great assistance. It was surprising to find what conditions prevailed in parts of the city where we supposed there was great cleanliness and care. These records are kept in the office of the Board of Health for public inspection, so that people coming to the city and wanting to look up a certain part of the city are in the habit of coming to the Board of Health office and inspecting these records. I only speak of these things to show the value to the Health Board and to the community of trained assistants. After all it resolves itself into a question of money. It was a hard matter at first to get our common council to raise the appropriation, but as the people began to appreciate the work done by the board, and they began to see the practical results, the money came more easily, and when a few years ago we asked for an increase in the appropriation it passed common council without opposition. I believe the health of the communities can be vastly improved, and that the time is not far distant when all our towns will have trained assistants to look after the work intelligently and faithfully.

Dr. LEAL—Dr. R. B. Fitz-Randolph, Director of the State Laboratory of Hygiene, Trenton, N. J., was to be here and present a paper, but he was detained and Dr. Hunt will read his paper. (For paper by Dr. Fitz-Randolph, see subsequent pages.)

Dr. LEAL—Mr. President, I have asked Dr. Woodhull, of Princeton, to say something on this subject.

Dr. A. A. WOODHULL—Dr. Leal asked me only a few moments ago to say something on the subject, so that I speak without preparation. I doubt whether anyone questions the desirability of having intelligent and educated inspectors, but the difficulty is to obtain them. In small towns to get a competent man, other than a member of the board itself, necessarily involves payment out of proportion to the ordinary appropriation for such a board. This is a practical problem which we have in Princeton, and I suppose other towns have trouble to get money to pay an inspector, and particularly have difficulty in getting a competent inspector when they have the money. I do not

mean that in Princeton the council has refused any request of the board for money, but that the board, knowing the resources of the town, has not attempted to get a salary adequate for a trained man. Neither has such a town ordinarily work enough fully to employ a high-grade inspector. I doubt very much whether, in our own case, we could find a person to pass the examination in case we should lose our present inspector. I should be very glad to know how the smaller towns, which require work of this kind, manage. A course of lectures was delivered in our university, a year or two ago, on the subject of "General Sanitation," but this was not to train men as specialists, although those students acquired some practical knowledge of the subject. This course is now suspended and, I believe, abolished. I don't see exactly how we are going to educate our inspectors for such towns as the most of us live in, and I should very much like to receive some information.

Dr. LEAL—I will now call on Prof Hall, of Lehigh University.

Prof. HALL—Dr. Leal, I think, misunderstood my reason for coming here. I came to listen and ask questions rather than to address you. I represent a college which is in a position to give such training as men who have to do with this work need. As a university, of course, we are interested in the training of health officers for towns. We have all of us seen something, I think, of the defects of the health work in the smaller towns. The difficulty of getting competent men gives rise to the custom of giving that work to men already occupied in other business. We are particularly interested, as a university, in this matter and wish to do what we can for the men we have, and I came here to see what openings there are for men trained for such work, and to ascertain if there are enough places to justify a college course for training men. This is what I want to find out, and I hope some data will come out in the discussions or in private conversations. Dr. Leal tells me, and there are others that tell me, that they need men trained for this work. We have facilities for training men in bacteriology and chemistry. With a well-equipped laboratory and teachers I do not see why we should not train them, and I want to find out whether we would be doing a wrong to the students by training them for positions which do not exist or for which there is no adequate compensation.

Dr. LEAL—I will call upon Dr. McLoughlin, of Jersey City, to say a few words.

Dr. GEORGE E. McLOUGHLIN—I was out of the room at the time Dr. Hunt read Dr. Fitz-Randolph's paper, and I did not hear all of it. This subject is one of vital importance to all of us having a connection with boards of health. The speaker just prior to the gentleman from Lehigh referred, in his remarks, to health inspectors. I wonder if he meant health inspector or health officer.

Dr. WOODHULL—I am speaking only of the practical experience of our board. We have a board and we have an inspector, and no other official except an unpaid clerk. The inspector is not a member of the board. He does all the work which is done in the way of inspecting, disinfecting, etc. He is the working force of the board, acting under the direction of the President, who is the administrative officer.

Dr. McLOUGHLIN—I only want to get the matter straightened up. I don't quite understand Dr. Leal, whether this discussion is on the subject of health officers or health inspectors.

Dr LEAL—It is on the education of health officers.

Dr. McLOUGHLIN—There is one thing which comes to my mind in connection with this subject, and that is the utter lack of facilities which we have for the payment of the health officer. I don't believe that the average man who has taken a course of this kind would be thoroughly satisfied with the average salary that a health officer can obtain, but I think perhaps in the near future the pay of health officers will probably be nearer an adequate compensation for their work. I have often felt it a great loss to our health officers that there was no course in any of our colleges where they could go once or twice a week and take a course of study concerning the duties pertaining to their office. There is no doubt in my mind but that great benefit would result. I think if any of our colleges would take up this matter and give a course of a month to a health officer, say three days in each week, it would be a movement in the right direction, and I think that it would be preparing the way for more thorough education on that subject. I would like to say a word at this time in regard to the examination of health officers and health inspectors. We have in Jersey City two

or three of our sanitary inspectors who are still unlicensed. We are expecting that they will be licensed very shortly. Naturally I have been watching the examinations with some interest as to fairness, etc. One question on the last paper as I recall it was, "What is a sanitary analysis of water and how would you interpret it?" I think in plain words that is a "corker." I think our examiners should be a little more considerate of their men in asking such a question. Possibly I should be enlightened as to why they asked such a question. For the average man to face a question like that is a little hard.

Dr. A. C. HUNT—I will endeavor to answer that question. The method by which papers are formulated is to ask each examiner to present questions, and from these questions the papers are made up. The question referred to was asked of the health officers, and the idea of the examiner was that the health officer should know what a chemical examination meant and what a bacteriological examination meant.

Dr. McLOUGHLIN—Was he asked by the paper to give a full description?

Dr. HUNT—He was not.

Dr. McLOUGHLIN—How is the average health officer to know about the chlorine in water? I think the question a little unfair.

Dr. LEAL—I would like to call on Dr. G. K. Dickinson, of Jersey City.

Dr. DICKINSON—My interest in this topic extends back to the time when I was on the Legislative Committee to prepare a bill. Theoretically it is a grand matter, but practically it has misfortunes just at present. We have two or three things to consider which make it difficult to render work as useful as we would like. One is the matter of politics. In some towns you are not permitted to select men you like, but the politicians interfere. Then again the average man is not educated on these lines. We cannot get a sufficient number of men to apply for the positions who are up to the standard. Our idea is to get men to apply whom we think are competent in a general way, and give them the position pro tem. and then have them take the examination. If after two or three examinations they fail they are then asked to quit. I think the plan of having sanitary clubs an excellent one, and to hold meetings in conjunction with

the State Board of Health or in the counties or cities of the State. I sincerely hope that the bill presented in the last Legislature for this purpose, and which did not pass, will be presented again this year and that it will be passed.

Dr. LEAL—I declare the discussion open to any member who has anything to say.

THE PRESIDENT—We would be glad to hear from any member, as this is an important subject.

Dr. SCHAUFFLER—I want to ask someone to give us a brief outline of what the examinations referred to cover.

Dr. HUNT—Dr. Leal has asked me to discuss this subject. The law requiring the examinations was passed in 1903, and it became operative January 1, 1905. Since the passage of the law four examinations have been held, and about one hundred applicants have been examined. Probably from fifty to sixty per cent. have qualified. Probably the State Board of Examiners are open to some criticism, but it is a very difficult matter to get questions which are satisfactory to us, and yet through which we can ascertain whether an applicant has sufficient knowledge to fill a position. We hope that in the future the examination questions will improve in character, and that the men will likewise improve in knowledge. It is difficult for me to speak of the character of the men who apply, as there are a number of these men present, but I will say that a large number of the applicants who come before us are absolutely unqualified for positions as health officers or inspectors. Many questions asked of applicants are in reference to the health laws of the State, and others relate to disinfection of dwellings, methods of transmission of disease, etc. One gentleman has asked how a health officer may be secured in a town like Princeton where the appropriation is small. The suggestion has been made that possibly in time one health officer, thoroughly qualified, will be able to serve three or four communities adjacent one to another, and in that way, with an assistant in the various municipalities, he will be able to serve a number of districts. Dr. Leal has a plan in view for the instruction of sanitary officers, and I believe this must be arranged for. Some of the applicants have had no preliminary instruction, and have no idea of what they are talking about. If these men are to be trained it must be by demonstration. I believe the time will come when we will have

such a school. A course of instruction was carried on at Rutgers College for a time, but it has been discontinued.

Dr. T. N. Gray—Evidently there are two questions before us, one in regard to health officers and the other in regard to health inspectors. I would like to know the standard in regard to each.

Dr. Hunt—The law defines that, Dr. Gray. There is no standard.

Dr. Leal—The sanitary officer does not have to display as much knowledge as the health officer.

Dr. Gray—Is there no well-defined standard? It seems to me the cart is before the horse. Get a standard and grade the questions according to standards.

Dr. Leal—Practically that standard is only in the mind of the examiners; theoretically there is such a standard. The college student has no such standard.

Dr. Hunt—We have published a circular stating all of the topics upon which questions will be asked, and we refer to text-books covering these subjects. We require that applicants shall answer correctly seventy per cent. of the questions asked.

James Owen, C.E.—As I understand the health inspector business it requires three functions—first, executive; second, professional; third, mechanical. It seems that to demand all these qualifications in one man is asking too much. I know these three qualifications are necessary, but the professional work should be undertaken by the Board of Health itself and the health officer. The executive functions are either professional or mechanical. The mechanical part could be given to a man qualified for that part only, which is purely detail work. The point I want to suggest is, that these different functions should be considered.

Dr. Leal—I see our time is gone and I will close the discussion very briefly. I agree with what the gentleman has just said, but certainly that is a matter of detail. It is a matter for each local board to manage. The condition of affairs which led us to urge the passage of this act was the fact that in a large majority of cases in this State wherever sanitary officers of any sort were to be selected the selections were dictated entirely by politicians. There were exceptional cases, perhaps, where this was not true. The passage

of this act is a decided improvement in this respect, and a mere politician cannot now pass such an examination. The knowledge he will get will be of service to him, but the probability is that it does not go far enough and mechanical training is needed. For example, in the disinfection of a house, how does the ordinary man know that the house is properly disinfected? He has no idea why things should be so and so. This should not be, but he should be taught the whole process. The idea some of us have is, that a school or a course of some sort should be started, either in this State or near to us, on a small scale at first, where candidates could receive this practical training, this technical knowledge how to use their hands. At the present time we could not make the course very long. As men come forward salaries would increase, different schemes would develop and we could get a better class of men, and the course could be improved from year to year. In order to obtain these results and to take advantage of the suggestions we have heard this afternoon, I offer the following resolution:

WHEREAS, In the opinion of the New Jersey Sanitary Association it is necessary, in order to supplement what has been accomplished by the act of the Legislature approved April 8th, 1903, some means should be provided for the technical education and practical training of candidates for the positions of health and sanitary officers; therefore be it resolved, that the president of this Association shall appoint a standing committee of four to be called "The Committee on the Education and Training of Health and Sanitary Officers," and that such committee be empowered, without expense to this Association, to provide what may seem to be the best means for such education and training of said officers.

THE PRESIDENT—This motion has been made and seconded, are there any remarks?

Dr. WOODHULL—I should like to ask whether that resolution refers to the health officer as representing the Health Board and having the initiative of action, or whether it refers to the health inspector in the sense I have discussed it.

Dr. LEAL—It refers to all health and sanitary officers, all officers engaged in sanitary work.

Dr. DICKINSON—Should it not refer to all who are interested in sanitation?

Dr. LEAL—I have no doubt the committee would throw it open to anyone desiring to take advantage of the course. It is primarily for the training of health officers.

Dr. McLOUGHLIN—I think it an excellent motion and hope it will prevail.

Dr. WOODHULL—An even number on a committee is an awkward one for business. I offer as an amendment that the committee should consist of five.

Dr. LEAL—I accept that amendment, Mr. President.

The motion as amended was carried.

THE PRESIDENT—I will announce the committee this evening. The next paper on the program is entitled "Creameries: Their Construction and Management," by George W. McGuire, Trenton, N. J. (For paper by Mr. McGuire see subsequent pages.)

THE PRESIDENT—You have heard the reading of this excellent paper by Mr. McGuire, and as no one has been appointed to open the discussion we will have a general discussion. If anyone would like to discuss this paper we would be glad to hear from him; if not we will proceed to the next order of business.

Dr. DAVIS—I think the thanks of the Association should be given to Mr. McGuire for this excellent paper, and that it should be printed in our annual report.

THE PRESIDENT—We will now have the report of the Publication Committee by the chairman, Dr. D. C. English, of New Brunswick, N. J.

Dr. ENGLISH—The Proceedings of the last annual meeting were issued, as usual, in a very creditable form, and they have been distributed to the members and others who have applied for them. The distribution of the Proceedings last year was delayed a little longer than usual, and this delay was caused by persons failing to return proof promptly. I would like to make the suggestion for the coming year that when the speakers receive proofs that they will correct them immediately and send them to the chairman of the Publication Committee. Prompt return of proof will enable us to send out the annual report of the Proceedings earlier.

THE PRESIDENT—We will next have the report of the Committee on Uniform Sanitation. M. N. Baker, C.E., of

Montclair, N. J., the chairman of the committee is not present. Is there anyone here to report? If not we will have the report of the Committee on Legislation, of which Col George P. Olcott, of East Orange, N. J., is chairman.

Col. OLCOTT—The Committee on Legislation have no special report, as there was no legislation last year especially relating to this Association.

THE PRESIDENT—The Committee on Animal Diseases and Animal Food will report next. W. H. Lowe, D.V.S., of Paterson, N. J., the chairman of this committee, is not present. If there is no one here to report for Dr. Lowe we will proceed to the report of the Committee on Methods of Garbage Disposal. Dr. John L. Leal, of Paterson, N. J., is the chairman of this committee.

Dr. LEAL—The committee reports progress.

THE PRESIDENT—The next will be the report of the Committee on the Prevention of Malarial and Typhoid Fevers. Dr. G. K. Dickinson, of Jersey City, N. J., is the chairman of this committee.

Dr. DICKINSON—Last year I reported for this committee, and our committee presumed that we had been discharged I will take advantage, however, of the opportunity to say a few words. The problem of the control of malarial fever has been thoroughly worked out. This applies also to typhoid fever with one exception. There is one point in common in these two diseases, and that is the relation insects bear to them. We know that mosquitoes transmit malarial fevers, but we have not as yet, I think, had sufficient importance put on the relation of flies to typhoid fever. We find scattered through our literature, and to a certain extent in some of our text-books, matter in reference to the relation of flies to typhoid fever, but I think it behooves us to take the initiative in this matter, and I propose that a committee be appointed to investigate the relation that flies bear to this disease. I would like very much to have the Association take up this matter.

Dr. ENGLISH—I second that suggestion, and move that that committee consist of the Committee on Prevention of Malarial and Typhoid Fevers, and then next year we will have a report.

This motion was carried.

Dr. Dickinson—I think Prof. J. B. Smith is not present, but I suggest that he would be a very important man to have on that committee.

The President—With the permission of the Association I will add Prof. John B. Smith, of New Brunswick, N. J., to that committee. The next will be the report from the Committee on Civic Sanitary Societies. Rev. Adolph Roeder, of Orange, N. J., the chairman of this committee, is not present. If there is no one here to report for him we will go to the next order of business, which is miscellaneous business. We will hear the report of the Treasurer, Col. George P. Olcott, of East Orange, N. J.

The Treasurer stated that he had much pleasure in making his report on account of the fact that he had on hand the largest balance ever reported. (For report of Treasurer, see subsequent pages.)

The President—I will now appoint the Nominating Committee and the Auditing Committee, and at the same time the Committee on the Education and Training of Health Officers. For Nominating Committee, H. B. Baldwin, C.E., Dr. H. H. Davis and Dr. George E. McLoughlin. Auditing Committee, Dr. A. C. Hunt and Dr. G. K. Dickinson. On the Committee for the Education and Training of Health Officers I appoint Dr. John L. Leal, Paterson, N. J., chairman; Dr. B. VanD. Hedges, Plainfield, N. J.; Dr. G. K. Dickinson, Jersey City, N. J.; Dr. H. C. H. Herold, Newark, N. J., and Dr. A. A. Woodhull, Princeton, N. J. I am requested to announce that the registry book is here for the registration of members, and I also announce that the meeting of the Executive Council will be held immediately after this meeting.

Motion to adjourn was made and carried.

EVENING SESSION.

The evening session was called to order by the President at 8.40.

The President—Our evening session will be opened with prayer by Rev. C. P. Butler, of Lakewood, N. J.

The Vice-President—The next paper will be the President's Address, entitled "Our Association—New Jer-

sey Sanitary Association," by Norton L. Wilson, M.D., of Elizabeth, N. J.

(For address of President, see subsequent pages.)

THE PRESIDENT—The next paper on our program, entitled "Secret Nostrums," will be read by Samuel Hopkins Adams, Esq., of *Collier's Weekly*, New York City.

Mr. Adams stated that this winter there would be presented in the Legislature, in many States, a bill to restrict the sale of patent medicines. It will not be as radical as many would like to see it, but it will be worth working for, and I would like to appeal to this Association, through its Legislative Committee, when the bill comes up to get behind it and not to let it lapse without any medical support, as occurred in Massachusetts two years ago, and the few legislators who stood up for it had to do it without any aid from the medical profession.

(For paper by Mr. Adams, see subsequent pages.)

THE PRESIDENT—Unfortunately, Alexander Lambert, M.D., of New York, who was to open the discussion on this paper is not with us to-night, and I have asked Dr. T. N. Gray, of Orange, N. J., to open the discussion.

Dr. GRAY—It was not very kind of the president to ask me to take up this paper without preparation. Mr. Adams has given us a very interesting paper on the testimonial side of the patent medicine business. The fact remains still that patent medicine companies spend money and get returns for it. We physicians know that the patent medicine business could not be kept up except for the sale of its goods in drug stores. It is not only the ignorant, but also intelligent people, who are swayed by these testimonials. In regard to the ethical side of those medicines which are advertised by the profession. The profession is largely to blame for their sale. There are none of those medicines on sale, but what an educated physician could write a prescription for them and an educated druggist could put up the prescription. I have had druggists tell me that they sold almost as many of these medicines on the physicians prescriptions, as they do on prescriptions written by the physician from his materia medica. The physicians should get behind any bill against patent medicines and push it through. Every proprietary medicine should have printed on its labels the formula in full, giving not only the ingredients but the quantity of each.

Mr. Baldwin—What we have heard to-night is a revelation to many of us, and it is only through publicity of this kind that we are educated to know the harmful results of these preparations. Most professional men have been asked to give testimonials, and I remember a number of years ago that I had such a request from a manufacturer of vinegar. He wanted the vinegar analyzed and a statement made. I made the examination, but I did not think it cider vinegar and plainly said so in a report. This was immediately followed by a letter from the firm, stating that they were very much surprised at the result of my examination and could not understand how I differed with so many prominent chemists throughout the country, and included with the letter a large number of testimonials from all over the United States, stating that the vinegar was of the best quality of cider vinegar. Another thing, which I think has been mentioned in *Collier's Weekly*, is perhaps not a harmful preparation, but one which is fraudulent, and that is the so-called lithia waters. There are any number sold which contain no lithia whatever, and I doubt if there are any natural waters which contain enough lithia to have medicinal effect.

Mr. F. B. Kilmer—I have been very much interested in Mr. Adams' paper and also in the general discussion. To-night, I understand, in the Waldorf-Astoria, there is in session another association to consider another side of the patent medicine question. In that association, I understand, there are forty million dollars invested. Irrespective of that it seems to me there is an amusing side and there is a very serious side. In my experience as a pharmacist I have noted that a demand has been created, through advertising, for these patent medicines, and the pharmacist is forced to hand these medicines out to the public. It is deep rooted and it will not be unseated in a day nor a year. There are hundreds of instances where cocaine, morphia, opium and alcoholic habits have been formed by the use of these proprietary or patent medicines. That is the serious side for an association of this sort to consider. We have but little to do with the fact that a man who pays a dollar for a bottle of patent medicine only gets five or ten cents' worth, but the fact that our people are being undermined by the patent medicines which contain deleterious drugs is worthy of most serious consideration. The statements which have been made I

believe are true, and much more could be said. The gentlemen, I believe, struck the keynote of the situation in the first part of their remarks—that is, if you put on labels of just what these medicines are you take out the underpinning. It is the mystery attached to them which is largely responsible. Not long ago in my laboratory a friend of mine brought in a bottle of consumption cure and asked me to examine it for him. I examined it and it was a harmless remedy, flavored up with alcohol and other substances. The harm was that the party was taking that remedy and going against the advice of her physician, who wished to send her to another climate to take a course of treatment for the cure of consumption. The gentleman also spoke of a patent medicine bill. In the Legislature of New Jersey, and in many other States, each winter certain patent medicine bills have been introduced. Somebody gets up a bill which is a strike on the patent medicine men for the purpose of inducing them to put money in the lobby. Some bills, however, are put up in good faith, and I believe this Association could do no better service than to support bills of this sort. In my opinion the best sort of a bill which we could endorse would be one to label these medicines just what they are and let the public know what they are taking, and I think you will at least curb the sale to a degree.

Dr. D. C. ENGLISH—I do not rise to discuss the merits of this question, but to express the great pleasure it gives me to listen to this paper and to the discussion given us thus far. The last thing in the world that the manufacturers of these proprietary medicines desire is discussion, and they are doing their utmost to stifle discussion of this matter. It is known to many present that Dr. Frank Billings prepared an address and delivered it before the American Medical Association on this subject, and the proprietary medicine men, who have millions of dollars invested in this business, are doing all they can to prevent that paper reaching the public and the profession through the medical journals. I have the honor of being a member of the Publication Committee of the Journal of the Medical Society of New Jersey, and a communication came to us that if we printed that paper in the journal we would be liable to prosecution for libel, and every member of our Publication Committee and the editor voted that that paper of Dr. Billings should go in the December number of the Journal of the Medical Society of New

Jersey, and the State journals throughout this country are to print the paper and thus enable medical men to understand the enormity of this evil which we are fighting. There are millions of dollars to be used in this business to stifle publicity. I say all honor to *Collier's Weekly* and the *Ladies' Home Journal* for the grand work they are doing in bringing these facts before the public, and I think when the facts are known and the enormity of the evil is comprehended there will be little difficulty in passing and enforcing these laws. To let the public have the facts, and let them know the deleterious effects of these medicines, is the only way to stop this business. Let the people know we are fighting their battles when we fight the nostrum evil, for it is affecting their highest interests vastly more than the pecuniary interests of the medical profession. My own belief is that these deleterious nostrums are making more and more difficult work for the profession in curing or relieving the sick and so tending rather to increase than diminish their incomes.

Dr. DAVIS—I only want to say a few words. To my mind no more important subject was ever brought before this Association. Nothing can be done which will benefit the public more than to keep up this fight. The Winslow soothing syrup is familiar to everyone. To my own knowledge and belief I have seen children die from excessive doses of this syrup. I believe that it is the duty of every man not only of this Association but every medical man to do what he can to carry on the fight started here to-night. I am sure if we can wipe this out we will save at least five hundred lives every year.

Dr. B. VAND. HEDGES—I was much impressed the other day by a story which shows what a hold the patent medicine men have on the people. The story is in reference to a poor, old woman who came to Dr. Greene with a prescription for a rheumatic cure. He could not supply her with a bottle of the rheumatic cure that day as he had nothing but some bottles of consumption cure, so they soaked the wrapper off of a consumption cure bottle and put a rheumatic cure label on the bottle, and sold it to the woman, telling her to bathe her knees well with the medicine. Some time later the woman came for another bottle. They had replenished their stock by that time and told her that medical science had advanced and wanted to sell her a bottle of the real rheumatic cure, but she informed the clerk that he could

not fool her in that way and that she wanted the same medicine she had before as she had used it and it had helped her very much.

Dr. I. H. HANCE—In reference to letting the public have the facts there is one thing, I think, which has not been spoken of, and that is let the public know the facts in reference to the contents of the bottle. Let them know the harmful contents, and let them know that a bottle they paid a dollar for they could get for ten cents.

Dr. LIVINGSTON FARRAND—I would like to ask a question. The National Association, with which I have the honor to be connected, has any number of demands for recognition of the different consumption cures. Within the last ten days there came to my office a letter in reference to a consumption cure called "Sacco," a remedy which is advertised extensively. To my surprise I received a letter from an official representative of the Sacco Company in New York, asking for an opportunity to lay before me the plans for an institute and to get the endorsement of the National Association. I replied I would be very glad to see him. He came in and he was a physician of New York, a man of good standing. He said he wanted to talk over the whole thing very frankly. I said, "I don't think we can get on a good basis, as you know there is no cure for consumption, and you advertise a cure for consumption." He said, "I took hold of this remedy three weeks ago, and made it a condition that there should be no more advertising, and," he said, "there has been no advertising for two or three weeks. He then went on to tell me that this was a vegetable extract from some plant in South Africa, and that they were attempting to introduce it in an entirely ethical manner. He said sacco is not a cure, but a useful food and helpful in consumption. "All we ask is that your association, or the best physicians we can get in New York, join in taking cases, giving this treatment, and then stating frankly whether it is a good one, and we pledge ourselves not to sell this remedy to any patient except on a physician's prescription." I said, "If it is not a business affair, what is there in it then?" He said, "Of course, they expect to make money out of it. If we find it useful, Sacco will be advertised in the medical papers later." He cited a number of letters from many members of the medical profession, who expressed themselves ready to make experi-

ments in the use of this oil. This is a thing to be frowned upon, to my mind, for even if he be honest, of course, the moment these experiments are made they will then come out and make more extravagant claims. I express myself in doubt as to what action we should take in this case, and I would like to ask Mr. Adams for advice in this procedure.

Mr. ADAMS—I have not investigated Sacco yet. A week ago last Sunday there appeared in the Sunday *World* and the Sunday *Journal* a typical advertisement of Sacco consumption cure. Within five days, I received from the Sacco institute a mass of advertising material, including an editorial page from the *New York Health Journal*, I think, which is a fake publication, which sells it editorial space. I presume this cost the Sacco Company twenty-five dollars. I should not imagine that your association would care to have anything to do with it.

Dr. FARRAND—My question is what action should we take? It is not that we wish to have anything to do with it. It seems to me that we should take some action.

Dr. SCHAUFFLER—There is one side of this question which has not been touched on, and that is the fact that most all liquid patent medicines contain a large per cent. of alcohol. I received a communication from Dr. Lambert, in which he said that he hoped to be present to present that particular phase of the subject to-night. He said that the percentage of alcohol runs from seven to forty-six per cent. in these liquid proprietary preparations, that is, from the per cent. of a mild claret to the per cent. of the strongest whiskey. Many people who buy patent medicines are those who are ashamed to buy whiskey. He spoke of a friend of his who saw the following incident happen in a drug store: A woman asked for a certain amount of whiskey and the clerk said she could not have it as she had no prescription. She came in five minutes later and bought a bottle of Peruna and went away satisfied. One other thought occurs to me. Those who see the *New York State Medical Journal* will remember in Dr. Goff's address he speaks of a man taken ill. The physician who was sent for called the son of the man aside, and asked if he knew what was the matter with his father. The son said he did not know. The physician then told him that the old gentleman was suffering absolutely from acute alcoholism. The son said that could not possibly be as the father never

touched it. Naturally, the doctor wished to investigate, and it was ascertained that the old gentleman had taken a large number of bottles of Peruna, and the physician proved that he was suffering from acute alcoholism.

Dr. E. J. Marsh, Jr.—One idea occurs to me in connection with this campaign against proprietary medicines, and that is one that would seem, perhaps, to go directly contrary to the points brought out by Mr. Adams. It seems tó me that if a direct appeal were made to our public press that they might be influenced in a certain way to take part in the campaign. Of course we realize the enormous financial power exerted by the manufacturers of these nostrums over the papers, but among the editors of the papers of this country there must be some men of character and standing who could be shown what is going on, and the work that could be done for the public good, and I will say that I think the public press is willing to further a matter of public interest when it is properly brought home to them.

Dr. McLoughlin—I would like to say that the matter really comes down to the label on the bottle. About one year ago a very well known physician said to me, "Do you know anything about a certain syrup for a specific disease?" I said, "I have heard of it, but I don't know anything about it, but as the bacillus of that disease has not been discovered there can be no cure for it." He wrote to the firm in New York City, and they sent me a supposed slide of this bacillus. It might as well have been any other bacillus as the one in question as far as the slide would demonstrate it. They also sent me a large number of testimonials. They are using the syrup without knowing what it contains, and taking the word of the concern. It only comes down to this that it is not only the public but sometimes the physician as well who is fooled.

The President—As interesting as this discussion is we sholl be obliged to discontinue it.

Dr. Davis—If in order, I would make a motion that this subject be taken up again for consideration at the next annual meeting of the Association.

This motion was seconded and carried.

The President—The next paper on our program is that by Livingston Farrand, M.D., Executive Secretary National Association for the Study and Prevention of Tuber-

culosis, and he will speak on the subject of "Organization of Anti-Tuberculosis Campaign."

(For remarks of Dr. Farrand see subsequent pages.)

The PRESIDENT—I am sure we are all indebted to Dr. Farrand for his interesting talk on the anti-tuberculosis campaign. I will call upon Dr. Hance to say something on this subject, and then have Dr. Harvey give us some ideas.

Dr. HANCE—I am sure the plea Dr. Farrand has made will appeal to many of us, because many of us have suffered from the disease. I know there are those in this room who have suffered because of tuberculosis in their families. New Jersey, I am sorry to say, has been lamentably behind in the warfare against tuberculosis. During the past five years there has been a warfare started against tuberculosis which I think will crown this twentieth century with one of its greatest blessings. We know we can do a great deal. In the first place, it can be cured, and then we can educate the family of the person and many of the friends to carry on the fight. It seems to me that this Association, which is not purely a medical one, can do nothing better than to acknowledge the plea of Dr. Farrand and join in this fight. New Jersey has been going very slowly on this subject. Other States have taken it up, and their patients are being cured. In all campaigns we must organize, and we must organize on a sound, firm basis. We can do this no better than by joining the National Association for the study of tuberculosis. The first thing is the education of the people, but to educate the people we must find out where tuberculosis exists. You can practically only find it out through the medical men, and that brings us to the work done in New York City, where tuberculosis is reported to the board of health of the city, and the result has been fortunately a grand success, and to-day this is a disease which should be reported, and it seems to me in organizing we are going to accomplish these two great things, and I strongly urge that we organize in New Jersey for a vigorous campaign against tuberculosis.

Dr. T. W. HARVEY—The work of organization in the fight against tuberculosis is a matter which appeals to everyone. Within the last few years we have learned to look at this disease as one which is curable, and not only curable but it can be remedied or prevented, and a disease which

can be remedied is one which certainly an association like this should do its part to prevent. Organization for the prevention of this disease largely takes the form of educating the people who are liable to have the disease, and one thing to teach them is that it is curable when recognized early. The doctor should be urged to say this is or may be consumption, and as early as possible the disease should be acknowledged, as the chances of remedying it are better. That is one way of educating the people. It is a communicable disease to a certain extent, and knowing the means of communication, we know that the substances can be destroyed and prevented from communicating the disease to others. This educational movement, I think, can only be carried on by a well-organized association. In our town we have an anti-tuberculosis committee, which has been in existence perhaps two years. There are two or three physicians on the committee, and the rest are laymen and women, and the women are doing a remarkable work in connection with it. There are a number of associations interested in the movement, and different associations contribute different things toward the work. The duty of some of the nurses is to go to the patients' houses, and they tell them how to live so they will not be a menace to other people in the house. The most important part of the work is to teach the patient not to be a menace to other people, and to teach the people not to be frightened to death because a member of the family has consumption, but to fight the disease intelligently. That is the work for organizations, and that is what organizations can do. I have just picked up the report of one of the nurses in our town. During the year she made three hundred calls on sixty-eight patients. That is only part of it, because the whole community is getting educated. We are working through the trades union there in one way or another. In that way, I think, an organization can do practical work in all towns throughout the State.

THE PRESIDENT—The hour is getting late, but if there are others who wish to say a word or two we shall be glad to hear from them.

DR. GRAY—I am an officer of the association which is called the American Association for the Prevention of Tuberculosis. At the meeting of that association held in Atlantic City last March, eight hundred delegates from all

over the United States were present. We try to make all members of the family teachers as to how to fight the disease.

Dr. HARVEY—I offer the following resolution:

Resolved, That the New Jersey Sanitary Association looks with favor on systematic organization for anti-tuberculosis work in New Jersey, and that in furtherance of such efforts a committee shall be appointed to act in an advisory capacity for the establishment of such organizations.

This resolution was adopted, and the President subsequently appointed Dr. T. W. Harvey, of Orange; Dr. I. H. Hance, of Lakewood, and Dr. D. C English, of New Brunswick, as the committee.

THE PRESIDENT—I would remind you that a meeting of the executive council will take place immediately after the adjournment of this meeting.

The meeting was then adjourned.

THIRD SESSION.

The third session was called to order by the President at 10:05 on Saturday morning, December 9th, 1905.

THE PRESIDENT—It has been the custom to have a question box, so that any questions may be put in the box and later have the box opened and the questions answered as far as possible. If questions are handed to the Secretary, he will take care of them. The first paper on the program for the third session, entitled "Medical Inspection of Schools," is by Dr. F. S. Shepherd, of Asbury Park, N. J.

(For paper by Dr. Shepherd see subsequent pages.)

THE PRESIDENT—I am sorry to announce that Mr. James E. Bryan, of Camden, who was to open the discussion on this paper was unable to be here, but I am glad to announce that Dr. A. B. Poland, of Newark, has consented to open the discussion.

(For remarks by Dr. Poland see subsequent pages.)

THE PRESIDENT—Has Dr. Brewster anything to say on this subject?

Dr. GUY O. BREWSTER—From information gathered from county and city superintendents of schools, I have learned that there are at present thirty-one salaried medical school inspectors in this State, receiving from $50 to $800 a year. One county has voluntary inspectors examining the eyes and ears only. Another county has a card system by which the principals report cases of actual sickness. One-half of the counties have no medical school inspectors, and one-seventh of them have but one inspector in the entire county. Physical education in various forms is taught in one-half of the schools, and physical exercises and recreative work exists in a desultory way in the other half. In New York City, where the work of medical school inspection has been instituted on a scientific basis in conjunction with physical education and recreative work, we find an average of one-fourth of the pupils examined suffering with flat-foot, curvature of the spine, under-developed chests, pigeon breast or flat-chest, drooped shoulder or bowed legs and knocked knees, and many cases in which there are two or three of the foregoing conditions existing. Organic heart disease and hernia are frequently noted. Varicocele among the boys exists in as high a ratio as three to ten in a morning's examination, and partial deafness and refractive errors are found in almost one-fourth of the cases examined. New York is a shiting center of population, and it is well to note that many of the pupils examined are country bred.

The necessity for systematic medical school inspection for the detection and suppression of acute diseases, the observation of deformities and other pathologic conditions, and their correction by a scientific course in physical education is unquestioned. This is the greatest problem in prophylaxis which the world is facing to-day, dealing as it does with individual life when the possibilities of establishing life habits of right living are at their best. Since 1903 we have been striving among the educators, physicians and people of this State relative to the demand for a legislative act pertaining to medical school inspection and physical education, and believing that everything is propitious at the present time, we purpose introducing the bill during the coming session of the State Legislature, and earnestly request the assistance of the members of this Association.

THE PRESIDENT—Is there any further discussion?

Dr. JOSEPH TOMLINSON—In view of the interest taken in this subject and the breadth of the subject, embracing not

only the health of school children, but also embracing the education and physical instruction or development of the school children, I move that a committee of three be appointed by the President of this Association for the promotion of medical inspection of schools and physical education in the State.

This motion was carried.

THE PRESIDENT—Are there any further remarks on this subject?

Dr. DICKINSON—This topic is to my mind as important as anything that has come before us. Certainly from the literature on the matter, and from the condition of the laws as existing in the different States, it will be some years before the subject is thoroughly threshed out. The law demands that every child of school age shall attend school, but it does not demand that the child shall attend public school. We also have parochial schools and private schools, and it seems as if we should investigate conditions there. Further, the children that attend public schools are prone to deformities and defects, and they are more prone to contagious disease than grown people; therefore, to accomplish a successful investigation we will have to go further back. My feeling is that the board of health, or some proper body, should have the say in the selection of the school site, and not have the building erected where the light is cut off, or where there is too much noise. The construction of schools should be on hygienic and sanitary lines, so there shall be no tendency toward diseased conditions. The construction should be such that the interior is so simple that the janitor can thoroughly clean it, and he should also be instructed as to the proper things to clean it with.

DR. ALEXANDER MARCY, JR.—It seems to me this is a very important subject and well covered by the reader of the paper. It also seems that the responsibility rests upon the medical inspector in regard to this matter. There are very few families in the State of New Jersey, or any other State, who do not have a family physician, and if the man who occupies that relation does his full duty certainly these glaring defects should be discovered before the child enters the school. While medical inspection of schools is an important thing, at the same time there is an indictment resting against the family physician and the medical profession

in not seeing to it that these children are in proper physical condition before they are ever allowed to enter the school.

THE PRESIDENT—I appoint the following gentlemen on the committee in reference to the medical inspection of schools: Dr. Joseph Tomlinson, Bridgeton, N. J.; Dr. A. B. Poland, Newark, N. J., and Dr. Guy O. Brewster, Grantwood, N. J. Our time is limited, and it will now be necessary to cut this discussion short.

DR. DAVIS—I would like to say one word in regard to the location of schools. There is a law which requires that before the school is built the plans must be presented to the State Board of Education for approval. I would also like to ask Dr. Poland to tell us how he gets rid of certificates which come to him showing that a child is an unfit subject for vaccination.

DR. POLAND—We provide for a committee of three, consisting of the chairman of the Committee on Sanitation of the Board of Education, the health officer and superintendent on contagious diseases. The public are satisfied with their judgment, and all these cases are referred to them. No one else takes the responsibility. A case when decided is like a case decided by the Court of Appeals.

DR. DAVIS—But the law says that if a child presents a certificate, stating that the child is an unfit subject for vaccination, the child need not be vaccinated. I want to know if Dr. Poland gets such certificates.

Dr. POLAND—We send them to this expert committee. How they get rid of them I do not know. I suppose if a reputable physician went as a witness before this committee and satisfied them of the correctness of his diagnosis the fact would stand.

THE PRESIDENT—We will pass on to the next paper on our program, entitled "What Methods are Most Suitable for Disposal of Sewage on the Atlantic Coast," by George M. Fuller, C. E., of New York City.

(For address by Mr. Fuller see subsequent pages.)

THE PRESIDENT—The discussion on this subject will be opened by H. M. Herbert, C. E., of Bound Brook, N. J.

Mr. HERBERT—Mr. Fuller has covered the subject so thoroughly that little remains to be said. He has taken up the different methods of sewage disposal, and has ex-

plained them to us very clearly. Confining ourselves more strictly to the New Jersey coast, in which we are interested, it seems to me our towns and resorts along the seacoast should use the broad irrigation method, several of them joining together and buying property a short distance inland and properly purifying the sewage there. The country is very thinly inhabited near the sea coast and I think that a good method. The conditions of our settlements along the coast are peculiar from the fact that during three months the population is so much greater than during the remainder of the year. It is only during summer that it is really necessary to purify the sewage, and I think that the filter beds need not be operated in winter. No doubt our resorts need some method of taking care of the sewage. Last summer in Asbury Park I passed by the outer end of the fishing pier, and the stench arising from the outlet of the sewer at that place was something terrible. After that I went as far away as possible from that point to take my bath.

Mr. OWEN—Mr. Fuller has covered the whole ground so thoroughly that anything I say will be supplemental. I was reading the other day the statement that this country would be pauperized in a very few years if all our wastes are lost. I think in the future our wastes will be taken care of and not discharged into the sea. The city of Manchester recently issued a report showing the treatment of sewage there, and showing that the result was absolutely perfect. I think that the matter of discharging New Jersey's sewage into New York bay should be treated with a good deal of careful attention. The State of New York appointed a commission last year to examine into the problem of the pollution of New York bay incidental to the proposition of New Jersey to discharge sewage from New Jersey into New York bay. The commission has arrived at the conclusion that the further pollution of the waters of New York bay would be improper. They do not state that it would be harmful to health at the present time.

Dr. MCLOUGHLIN—The beauty, I think, of the different experiments which have been brought out is that the majority of men seem to be taking the very rational view that we must not expect the effluent from the sewage disposal plants to be sterile. There are a few men who take the ground that the effluent discharged into the stream must

contain practically no bacteria at all. I would like to ask Mr. Fuller if he would tell us about the effects of the sprinkling filter in winter time. Whether it does freeze up or not.

Mr. HERBERT—I should like to state that Mr. Appleby, of Asbury Park, has called my attention to the fact that last August the outlet sewer in Asbury Park was carried out in the ocean for a quarter of a mile.

Mr. CLYDE POTTS—I would like to say we find a great deal of sentiment against the purification of sewage simply because the people do not understand the matter. A great deal was done to obstruct the work on a plant which we were trying to install. The people threatened to get out an injunction, and finally to satisfy themselves a committee was sent to visit the plant which we had in operation. They were so delighted with the effluent discharged from the plant that they each took a drink of this sewage effluent, and it was as clear as spring water and apparently as pure. They put aside the sentimental features of the case, and reported to the "kickers" the conditions as they found them. A very high state of purification can be obtained.

THE PRESIDENT—We will pass to the next paper on the program, entitled "Disinfection as a Means of Restricting Communicable Diseases," by Henry Mitchell, M.D., of Asbury Park, N. J.

(For paper by Dr. Mitchell see subsequent pages.)

THE PRESIDENT—This paper is before us for discussion.

Dr. MCLOUGHLIN—The one point of this paper which appeals especially to me is that we should not lose sight of the patient as the means of spreading the infection. With a careful nurse, as the paper says, and the usual precautions as regards disinfection and cleanliness the chances are that the room need not be disinfected. Sanitarians are coming to the conclusion to-day that the spread of infectious diseases is very largely due to the individual going out among the people and spreading it himself, and not to any intermediate form of infection. In other words by the unrecognized ambulatory cases, as in cases of diphtheria, small-pox, typhoid fever, etc.

Dr. DICKINSON—I wish to say a word in regard to flies. It seems to me that flies may carry the infection to

other rooms, and that the patient should be protected by screening with netting. The physician should see that no flies enter or leave the room. The focus of infection is not necessarily the entire room, but such parts of the room as have been contaminated. Let the room be disinfected first by sunlight, then water and soap, and after this use your disinfectant.

THE PRESIDENT—If there is no further discussion we will pass to the next order of business, which will be the reading of minutes by the Secretary, as he was not here at the beginning of the meeting.

The minutes of the meeting of the Executive Council were read by the Secretary, and a motion made and carried that they be accepted. A motion was also made and carried that the nomination of officers made by the Executive Council should be adopted, and the following were declared elected:

President, H. M. Herbert, C.E.; First Vice-President, G. K. Dickinson, M.D.; Second Vice-President, J. B. Duncklee, C.E.; Third Vice-President, W. G. Schauffler, M.D.; Treasurer, G. P. Olcott, C.E.; Secretary, J. A. Exton, M.D.; Chairman Executive Council, Rudolph Hering, C.E.

Executive Council—D. E. English, M.D., W. J. Harrison, W. H. Shipps, M.D., T. Frank Appleby, T. W. Harvey, M.D., H. C. H. Herold, M.D., A. C. Hunt, M.D., R. H. Parsons, M.D., M R. Sherrard, C. E., A. W. Bailey, M.D., A. M. Bradshaw, Alex. Mary, Jr., M.D., E. Guion, M.D., Stewart Hartshorn, J. W. Griffen, H. B. Francis, T. N. Gray, M.D., G. E. McLaughlin, M.D., H. H. Davis, M.D., Jos. Tomlinson, M.D., Chas. J. Fiske, J. S. Wescott, with the ex-Presidents as Honorary Members.

The following committees were also announced:

Publication Committee—David C. English, M.D., Chairman, New Brunswick; Henry Mitchell, M.D., Asbury Park; James A. Exton, M.D., Arlington.

Committee on Membership and Registration.—Edward Guion, M.D., Chairman, Atlantic City; G. E. McLaughlin, M.D., Jersey City; B. V. D. Hedges, M.D., Plainfield.

Legislative Committee.—George P. Olcott, C.E., Chairman, East Orange; Henry Mitchell, M.D., Asbury Park; H. Brewster Willis, New Brunswick; Joseph Tomlinson, M.D., Bridgeton.

Committee on Transmission of Disease by Flies—Its Control and Prevention.—Gordon K. Dickinson, M.D., Chairman, Jersey City; A. C. Hunt, M.D., Metuchen; John B. Smith, Sc.D., New Brunswick.

Committee on the Organization of an Anti-Tuberculosis Society in New Jersey.—T. W. Harvey, M.D., Chairman, Orange; Irwin H. Hance, M.D., Lakewood; D. C. English, M.D., New Brunswick.

Col. Olcott—I move that a vote of thanks be tendered to the manager of the Laurel-in-the-Pines for the kindly and cordial manner in which we have been treated.

This motion was carried.

The President—Are there any questions to be asked? There have been none received thus far. I will again call attention to the fact that the registry book is still open.

The motion for final adjournment was then made and carried.

Treasurer's Report.

George P. Olcott, *Treasurer, in account with* The New Jersey Sanitary Association.

RECEIPTS.

1904.			
Dec. 1.	To balance cash on hand, ...	$148 56	
1905.			
Dec. 1.	To dues received to date, ...	276 00	
			$424 56

DISBURSEMENTS.

1904.			
Dec. 10.	James A. Exton, Secretary, expenses,......	$44 49	
	Charles J. Merrill, stenographer,...........	18 00	
	Laurel House, expenses, ...	5 00	
1905.			
Mar. 10.	David C. English, Public'n Com. expenses,	6 85	
April 11.	MacCrellish & Quigley, printing, ...	92 40	
	James A. Exton, Secretary, expenses,......	10 43	
Dec. 1.	Geo. P. Olcott, Treasurer, postage and printing, ...	7 10	
			184 27
Dec. 1.	To balance cash on hand, ...		$240 29

Respectfully submitted,

GEORGE P. OLCOTT,
Treasurer.

PRESIDENT'S ADDRESS.

Our Association.

BY NORTON L. WILSON, M.D., OF ELIZABETH, N. J.

Ladies and Gentlemen, Fellow Members of the New Jersey Sanitary Association:

It is now commonly agreed that no subject more vitally concerns the welfare of the community in which we dwell than that which relates to the physical comfort and healthfulness of its people. This fact was recognized thirty years ago by the Association whose representatives are gathered here to-night. From the beginning of its organization it has urged the importance of formulating rules for the prevention of disease, and sought to create in the minds of the public the opinion that it was better to devise means for prevention than for cure of the ills that flesh is heir to.

This Association has attained a prominence among the leading organizations of the country whose purposes and aims are of a similar nature, and it is with a feeling of justifiable pride that the writer may briefly review the record of an organization that has led the way in our State to the enactment of those many laws which have contributed so much to the prevention of disease and the promotion of public health.

The first meeting under its auspices was held in the city of Newark on the thirteenth day of October, eighteen hundred and seventy-five. In influence it rapidly grew and created an interest which gradually broadened. Due in large measure to its efforts, and as the result of its work, there was organized on the thirty-first day of March, 1877, the State Board of Health. Among the various States that of New Jersey takes high rank in the character of its work and in the influence which it exerts.

But, aside from this, the influence of this Association has made itself manifest in many other directions. Its

members early in its history began the agitation for better sanitation of the homes of the State. It anticipated the excellent work of the State Board of Health in this respect, and to it is largely to be credited the establishment of various local boards of health. These boards in times of peril quickly act, and by their work stamp out the epidemics which come from time to time, and which, unless speedily checked, are followed with most serious results. Recognizing the necessity of some quickly acting authority possessed of power and intelligence, this Society sought for years to educate the public, especially those of its members who are interested in matters pertaining to the promotion of the public health, that one of the first requisites was the appointment of educated sanitarians as health officers. We find in the annual reports of our own State Board of Health the insistment, oft repeated, that sanitary inspectors employed by local boards should be more efficient and possessed of greater intelligence. The need of such a requirement has been felt throughout the United States, and the movement for such improvement first began in this Association. Through the courtesy of the Trustees of Rutgers College the examinations of candidates for appointments by local boards of health to the office of Sanitary Inspector was first made possible. To-day many institutions throughout the United States have followed the example thus set, and now similar examinations are held in many institutions. As a result of the practice thus begun, the standard of efficiency found among the officers named has been greatly elevated.

In its agitation for a more efficient and intelligent service the Association was largely instrumental in promoting the efforts made in 1896 to procure the enactment of a law which provided for an examination, by some central authority, of applicants for appointment as local sanitary inspectors. The measure failed to become a law at the time, but attempts were not withheld, and finally, in 1903, a law was passed which secured an improvement in local sanitary inspection. That law requires of inspectors a preliminary examination. To the State Board of Health belongs primarily the credit of procuring the enactment of the law, but this Association was among the first to conceive and urge the adoption of the practice, and we make bold to claim and believe that to the Association will be accorded the credit of having taken no small part in the work of elevating the standard of the service.

In its annual report for the year 1885 the State Board of Health acknowledges its indebtedness for the valuable aid of the Association in all that relates to the sanitary welfare of the State. Among other things, the report states that "it (the New Jersey Sanitary Association) brings together many of the prominent workers in allied departments, such as civil engineers, chemists, teachers, health officers, etc., and enables them to become more familiar with the particular progress and needs of sanitary science and art. The one need of the State at present is efficient local health officers and inspectors." This was written twenty years ago. But, at last, there has been realized that which the Association has constantly urged as an essential prerequisite in this branch of the public service and the need of which the State Board of Health so deeply felt.

But there are other lines along which the Association has made its influence felt. It has carried on a constant fight against cholera, and to-day so rarely does this disease occur that to many of us opportunity has not yet come to see a case.

In the year 1885 the Society, realizing the importance of the subject, formally asked the Legislature to place the potable waters of the State under the care and protection of a State Board of Commissioners. At the same meeting it appointed a committee to consider and prepare a bill which would provide for the safe construction of dwellings, giving special attention to the feature of house drainage. It discussed the cutting and sale of ice in cities and towns and prepared and secured the enactment of a supplement to the law relating to this subject providing for greater safety. To the scourge of small-pox, then prevailing in Canada, resulting from the neglect of vaccination, attention was called and it endeavored to impress on parents, physicians and school boards the necessity and the high importance of securing a more general system of vaccination.

The result of its efforts along the lines mentioned are known to us all. It has contributed in no small degree to the results obtained. The Legislature in 1899 gave to the State Board of Health a general supervision over the purity of the water supply. In no State is there found a better supply of drinking water. Previously, in 1888, there was enacted a law providing for the safe construction of buildings and for a proper house drainage, and in 1895, through

the agitation of this Association largely, a law was enacted which empowers boards of health in cities of the first class to condemn and prohibit the sale or use of impure ice cut from polluted streams. Small-pox is occasionally still with us, but its prevalence is far less frequent and extended than heretofore, and it is fast disappearing from our State.

At the Twelfth Annual meeting, held in 1886, this Association urged upon the State Board of Health that it should direct attention of the township and other authorities to the law making mandatory the establishment of local boards of health. The State Board took the matter up, cordially seconded the recommendations of the Association and pressed it with zeal. As a result we now find in the State about four hundred and fifty sanitary districts all commendably organized as to personnel and working efficiently. The Association gave its attention to other questions at the Annual Meeting in the following year, and among other things called the attention of the Legislature to the evils and inconvenience arising from the dumping of its garbage by the City of New York near to the coast of our State and its return and distribution along the ocean coast and shores of the Hudson River. Some temporary relief was secured, but, unfortunately, the evil has not wholly disappeared. The demand for an abatement of the nuisance is greater than ever before.

In still other ways, also, the Association has been watchful of the interests of the people of the State. So long ago as 1891 it recommended the establishment of a sanitarium for tuberculous patients. Agitation in this matter has resulted in the beginning of the erection of buildings for that purpose. The great good which it is confidently believed that will result from this effort to arrest the ravages of the great white plague in our State can hardly be estimated.

Then, too, the work of preventing the sale of adulterated food and drugs has engaged its attention, and happily against such sales there are now written on our Statute Books no less than ten acts and nine supplements. And against the adulteration of milk, so vitally affecting the health of the people, its voice has ever been raised, and from time to time laws have been enacted which safeguard the public in this respect.

Repeatedly the question of sewers and sewage and disposal of effete matter, including garbage, has also been brought

to the attention of the people by the Association. A very marked advance has been made in this regard, and it would be difficult to find generally prevailing in any State a better system of sewers than in our own. In season and out the Association has presented the importance of the establishment of isolation hospitals for contagious diseases, and the advantage which would result from vaccination. It is a subject of congratulation that in some of the cities of the State, these views have found favor and that isolation hospitals have been established. Small-pox has been robbed in a great measure of its terrors. The writer has long thought that if each county would build its own isolation hospital and put in charge a competent person who could act as advising inspector for the various towns and boroughs in the county, not only would it be less expensive for the various towns in the counties, but would be most adequate in the care of communicable diseases.

From time to time the Association has listened to the reading of papers by its members in which has been set forth the fact that the mosquito carries malaria and that flies are the carriers of the germs of typhoid.

We would not claim entire credit for the measures that have been recently adopted and are in force to-day providing for the destruction of the mosquitoes and thereby relieving the State of one prolific source of chills and fever. Others have earnestly worked along the same lines and contributed in large measure to the result, but we would claim some credit for the education of the public mind along these lines, thereby making easier of accomplishment the adoption of the measures referred to.

The physical health of the rising generation and all that contributes to it is of the greatest importance. On it depends the vigor and morality of the citizens and the happiness and prosperity of generations to follow. The fact has impressed itself upon the Association, and it early recognized the importance and far-reaching results that would follow the physical examination of the children in our schools. It has long agitated the subject and now in many of our public and private schools such physical examinations are conducted.

We recognize that the system is not yet as complete and satisfactory as it should be, but a start has been made and

there is every reason to believe that within a few years the system will be so perfected that it will be adopted throughout the State with most beneficent results.

Thus briefly I have referred to some of the most important results attained either directly or indirectly by the Association through its active aid and support. It has played no insignificant part in the work accomplished and its members may well congratulate themselves upon the record of the past. The field is a large one and there is room for much work yet to be done. It can labor in a spirit of harmony with the constituted authorities by whom its help has ever been welcomed. It can find its reward in the satisfaction of knowing that as the result of its unselfish labors the people of the State wherein it finds its home will be benefited and advanced in all that makes for health, comfort and happiness.

The Laboratory Training of Health Officers.

By R. B. Fitz Randolph, A.C., F.R.M.S., Director State Laboratory of Hygiene, Trenton.

Many problems relating to sanitary science are best solved by laboratory methods. The diagnosis of certain communicable diseases, diphtheria, tuberculosis, typhoid fever, malaria, anthrax, rabies and, less frequently, some others are now commonly made by the bacteriologist. Rational and effective methods of disinfection were developed in the laboratory, and can only be controlled by laboratory investigation. The examination of water for the purpose of determining its fitness for potable use, investigations of the purity of foods and drugs, the sanitary control of milk supplies—these, and many other problems, can only be handled satisfactorily by laboratory methods.

The health officer is the most important factor in our sanitary system. He is certainly more important than the board of health which supervises his actions, because *he* is the man who does the work, who is constantly in touch with every detail of the sanitary administration. The success of such administration depends very largely on his personal ability, attainments and industry. It is therefore of the utmost importance that he should have a good understanding of the fundamental principles underlying the more intricate portions of sanitary work which are properly referred to the laboratory. Such a knowledge implies a good training in the natural sciences supplemented by special work in preventive medicine, hygiene, chemistry and bacteriology. A satisfactory training in these subjects can only be obtained in a college, hence the well-equipped health officer is necessarily a college-bred man. He is not necessarily a physician. In fact, it seems well established in this and other States that the best sanitary administrations are usually to be found in those cities and towns (I am now referring to places of moderate size) in which the health officers are not physicians.

While a health officer should be familiar with the laboratory procedures involved in making the more important examinations incident to the prosecution of successful sanitary work, it is neither necessary nor, as a rule, desirable for him to undertake such examinations himself. The duties of a health officer are essentially executive, and he is subject to all the troubles and interruptions inseparable from executive work. Always hampered by lack of adequate funds, he is usually unable to obtain sufficient assistance to satisfactorily perform his executive

duties, hence he has little or no time to devote to laboratory work, which, if properly performed, consumes much time, and frequently demands undivided attention for many consecutive hours. I know that such work is being done by some of the health officers in this State, and, in some cases, well done; but I believe that the taking of time for such investigations usually results in a distinct loss of efficiency in other directions. Such work can, except in the case of large cities, be more satisfactorily and economically performed in a central laboratory, such as is maintained in this State by the State Board of Health. It is therefore unnecessary for the health officer to be a specialist along laboratory lines, and much of the training necessary to produce a specialist may safely be omitted from his curriculum. His legitimate relation to the laboratory is that of a gatherer of material. His knowledge is needed in order to enable him to gather the proper material in the proper manner. He must also be equipped to interpret and apply to the local conditions or circumstances within his jurisdiction the results which the laboratory gives him. To do this intelligently he must be sufficiently familiar with the methods of examination used in the laboratory to enable him to comprehend their limitations, and to place a just estimate on the reliability of the results obtained by them. His training along these lines should be broad and comprehensive.

Creameries—Their Construction and Management.

By George W. McGuire, Chief Inspector Dept. Food and Drugs, State Board of Health, Trenton.

The original milk laws were intended to prevent the sale of skimmed milk for whole milk, or in any way to reduce its commercial value. All subsequent laws, not only in our own country, but abroad, are enacted with the object of safeguarding milk against every possible source that may affect it, from the time it is drawn from the cow until it reaches the consumer; these laws are to-day forcing the general milk supply to such a standard of purity that the ordinary purchaser may receive the same protection, as does the man who is able to pay for the so-called "certified" or "guaranteed" milk from high-class dairies.

Investigation by local and State authorities into the milk supply of cities, towns and private dairies is a daily occurrence in New Jersey. At all times the court dockets record untried cases against some milk dealer for his infraction of the milk laws. In the past twenty years the methods of handling milk have radically changed. These changes have been made necessary by the enormous increase in the population of cities. Instead of milk reaching the consumer direct from the producer, as formerly, much of it is now hauled to the creameries in small quantities from thousands of sources, and there transferred from the cans of the farmers to creamery receptacles and stored from twelve to twenty-four hours before being shipped to the different points of consumption, often hundreds of miles from the place of production. The quantity, so distributed from each creamery in this State, ranges from 500 to 20,000 quarts a day.

While the natural purity of milk is affected largely by its care at the farm-source, do we not expect too much of the average farmer when we require of him every observance of sanitation and he receives so little in return? Creamery prices are arbitrarily fixed for him and to safeguard his milk against all sources of contamination means to him more work and trouble without proportionate profit. Do we wonder that he becomes indifferent to fine detail in his dairy work? Could the farmer sell direct to the consumer he could not justly object to restrictions holding him to sanitary care, for the retail price would pay him for additional trouble and the general treatment of his milk at the farm-source could be more or less determined by a bacteriologi-

cal examination. In our own State this system is successfully operated, where farms adjacent to a town are sufficient in number to supply the entire demand, without the aid of mixed milk from the creamery. Creamery milk is the product of many farms, hence a bacteriological test could not determine a definite source of pollution.

An important step taken of late by the State authorities in the interest of pure milk, has been the thorough and systematic inspection of every creamery throughout the State. The good accomplished, as shown by results, is almost incalculable. There are 126 creameries in this State, which handle upwards of 400,000 quarts of milk a day. Heretofore our inspections of these creameries have been made necessary by some special cause. For example, cases of typhoid fever, scarlet fever and diphtheria we have traced positively and directly to the doors of some of these unsanitary plants. Some progressive creamerymen in our State find it pays to conduct their creameries with scrupulous care throughout; their system is to take milk from the farmers' cans into clean, well-ventilated rooms, and pour it into covered metal receiving tanks, it is then transferred by gravity, through suitable pipes, easily cleaned, to bottling machines, or possibly to separators or shipping cans, and during the entire process the hands of the operator do not touch the milk.

Every detail in the design for a model crematory should plan the protection of milk against dirt and contamination, so as to minimize the development of bacteria. If possible, sloping ground should be chosen for the building site, that milk can be conveyed by its own weight to containers without recourse to pumps, which at best are always hard to keep clean. Plenty of light and pure air are essential. This latter can only be had when the air without is purer than that within, which means a safe distance from offensive privy vaults, exposed drainage, pig sties, slaughter-houses, and such other conditions as produce foul odors; these I often find in close proximity to creamery buildings. Still worse than these to which I have alluded, is where the manager's family occupy apartments in the creamery with doors opening directly into the milk rooms. We all know the possibilities and probabilities of disease which come to every family; this, together with the domestic work, even to the family wash, which I have known to be conducted in these very milk rooms, is not only menacing, but fatal to healthful milk. I cannot too strongly condemn this arrangement; the Legislature should certainly prohibit by law this combination of creamery and dwelling.

LOCATION.

Since it is of great advantage to locate a creamery abutting a railroad siding, on account of easy access for shipping, it is not possible in most cases to select sloping ground on which to construct the building, and consequently it is more difficult to arrange the working rooms so as to take the milk in at an elevation that permits it to flow by gravity

from the receiving vat to the storing or bottling room. It is better where the ground is level to build an elevated roadway than to adopt the use of pumps to force the milk through long lines of pipes having several angles. In a number of creameries such pumps are never taken apart and cleaned; the pipes used are generally not more than three quarters of an inch in diameter and of rough inner surface; they cannot be disconnected for washing and sterilizing and yet are coated with decomposed milk over which passes the daily supply. In the modern creamery this difficulty is somewhat overcome by pumps especially constructed for the purpose connected with pipes of large diameter and of short lengths, easily parted for cleaning.

FLOORS.

Creamery floors generally adopted in this State are either concrete or wood. The latter are not to be recommended for the reason that, by the daily rolling of cans, they soon become worn, and this with the abundant use of water necessary to make and keep them clean rots the boards, allowing the waste fluids to escape to the ground beneath the creamery, rendering it filthy and causing bad odors to rise. Cement or concrete floors, if well laid with the best materials, are very much to be preferred; even these are very often found with extensive cracks and rough crumbly surfaces, which it is impossible to clean and which offer suitable conditions for the promotion of bacterial growth. I am informed that asphalt, if of good quality and well laid, meets all the objections made to the use of other materials for a creamery floor, and that where it has been adopted it has proved to be a complete success. It is not affected by the products of decomposition of milk, is impervious to moisture, and is improved by the frequent flooding of water.

DRAINAGE.

The stale odor noticeable in some creameries is the emanation from filthy drains hidden beneath the floors. These drains being made of wood, opened at the top, frequently extend the full length of the building. They are scarcely ever cleaned, and in time become rotted and saturate the ground with their leakage. This is a serious menace to adjacent wells. Creamery floors should be so graded that all drainage therefrom will run off through surface gutters at the lowest point of the floor, with outlets directly over the opening to an iron or earthenware drain pipe brought up to the level of the floor, and should have sufficient fall to readily conduct it to a proper disposal place at least 100 feet away.

WATER.

There is no one factor more important in creamery management than the water supply. Since the bacterial impregnation of well water comes

from or near the surface, it is essential that wells be sunk in locations where no ground or surface pollution be possible. When we know that the character of milk may be affected by small quantities of wash water remaining in, or adhering to, vessels and utensils, we see how requisite it is that this water be obtained from a source which is and will remain unpolluted.

STERILIZATION.

A proper sterilizing system should be a conspicuous feature in the economy of every well-regulated creamery, but I regret to say that only a few are thus equipped. Placing milk vessels and utensils in a tub or vat and steaming them a few minutes, or inverting milk cans over a steam jet for five seconds, the usual practice, is not sterilizing them. It is only when they are placed in a tight chamber and exposed to a temperature approximating 240 degrees Fahrenheit for thirty minutes, that complete sterilization takes place. This method should be in use in every creamery, and all bottles and transportation cans should be so treated. Patrons of creameries find it a great advantage to have their cans washed and sterilized at creameries having such outfits, they having no such facilities at their farms, but their part of the work at their homes is to see that sterilized cans, before and after filling, be kept strictly covered. We recognize the fact that it is almost impossible for the average creamery to reach a state of perfection in their efforts toward sterilization without a special outfit for the purpose, but the sooner they introduce it the better for them and their patrons.

WALLS AND CEILINGS.

Creamery walls and ceilings, whatever be their material, should have smooth surfaces and be painted white, so that dust, dirt and spattered milk shall stand conspicuous and call for cleaning. Some creameries I visit have straining boxes fastened to the wall, into which milk, as it is received from the farmers, is poured. In the operation it is splashed against the wall, and is left there to coagulate and dry. In time the dried accumulation scales and drops into the fresh milk, thus polluting it at the very threshold of the creamery.

REFRIGERATION.

Under the ordinary working conditions in creameries, milk is delivered to them several hours before it is shipped. When the farmers make one trip a day, as is usually the case, the morning's milk is frequently not cooled at all by the producer, but is delivered to the creameryman at a temperature ranging from 60 to 90 degrees Fahrenheit. In a very large percentage of cases the milk delivered by the farmer, whether it has been previously cooled or not, is at too high a tempera-

ture to keep sweet for any length of time and must be recooled. In order to effect the necessary reduction of temperature the common practice is to immerse the cans to the level of the constricted portion of the necks in water contained in vats. This water is kept cool by adding ice from time to time, a supply of ice being always present in the water.

On account of the widespread, but erroneous, notion that milk which is tightly enclosed during the cooling process becomes tainted with bad odors, because the so-called "animal heat" cannot escape, the lids of the cans are either tilted or removed altogether, in either case freely exposing their contents to the atmosphere. While there can be no doubt that this is a very efficient and economical method of reducing the temperature of the milk, it is nevertheless open to serious objections on the score of cleanliness. The exteriors of the cans when received are ncessarily dirty and become more so when rolled over the creamery floor. This dirt is washed off in the water of the vat. The ice is usually dragged over the floor of the creamery, and is also dirty when it reaches the vat. For the sake of convenience of handling cans the vats are depressed below the floor level, and, as the vat room is usually located in a dark part of the creamery building, the cleaning of the vats is generally neglected. This neglect, together with a desire to economize in the use of ice by the infrequent emptying of the vats, renders the water in them indescribably foul. More or less of this filthy water, containing millions of bacteria per cubic centimeter, invariably finds its way into the milk to the great detriment of the latter. When the water in the vat is so deep that cans float the liability to contamination by vat water is much increased. When the vats are covered water condenses on the under side of the cover and falls into the cans, carrying with it much of the filth which has accumulated on the cover when raised.

The practice indulged in by many creamerymen of agitating the contents of the submerged cans with a stirrer, which is rinsed in the vat water at the beginning and ending of the operation, also adds its contribution of undesirable bacteria to the already overloaded milk. It seems almost useless to insist on the utmost care and cleanliness at the dairy if its beneficial results are to be neutralized while the milk is in the creamery. There are only a few creameries which are equipped with model cold storage rooms, proprietors claiming that their maintenance is too expensive for general adoption. A method that will permit milk to be cooled economically and stored without contamination is to be strongly recommended and should be required.

BOTTLING.

The practice of bottling milk is an important feature of our subject, and when done by the latest improved methods has a decided advantage over can transportation. Ordinarily the bottling of milk is done in the general work room. This is wrong, since work of this character re-

quires a special room screened from flies, and barred against admissions to any except the employees, and it should be a condition of their hire that they be men of clean habits, dressed with care and in every way made fit to come in such direct contact with milk, as they are obliged to, when bottling. A good plan is to have the bottling room adjoin the wash room, so that all washed bottles could be placed in one end of a sterilizer in the wash room, and taken out at the other end in the bottling room. This perfect system insures all safety possible. The use of antiquated apparatus for bottling milk found in some creameries is productive of bad results. The machine which permits about the same quantity of milk to spill over the sides as goes into the bottle is the worst type. This overflow works its way through many bottles over a wood table, where it is caught in a can at the end, and is then poured back into the reservoir to be again bottled. In this style of machine, the wood table becomes so thoroughly saturated with milk, that to make it clean is impossible. A better apparatus is used in most creameries, these have no rubber joints as the others have, milk is discharged from the reservoir into bottles in accurate quantities, and all parts of the machine, being made of polished metal, are very easily cleaned.

Quite as important a factor as any I have mentioned is the matter of straining milk. I might cite many cases of flagrant abuse—I might say of decency—that has come under my observation. To see a man use his fingers to scratch through the filth collected in the straining cloth, to relieve the stoppage and to keep it up for a while, gives rise to rather sickening suggestions, especially when that very milk may be on your table the next day. The washing of cloths I leave to your imagination. Now, for the improved side of the question: First, milk for distribution, and 'tis that of which our subject treats, should not be in this condition; secondly, when it is so the best way to rid itself of these impurities, is through absorbent cotton which can be thrown away from time to time, at least this is my preference of the several methods I have observed.

How to operate a creamery properly is no intricate problem which but few can grasp, its fundamental principle is simply cleanliness from start to finish. This combined with good judgment and careful consideration for the serious results which may follow indifference seems to be all that is necessary in good creamery management. It is gratifying to note that all parties, after notification by the State Board of Health, have not only shown a willingness to act on their suggestions, but several have already laid new concrete floors, have replaced or repaired drainage systems, have installed modern apparatus and have instituted better methods in handling milk. This is the purpose and practical result of the espionage given to the milk supply of New Jersey creameries during the past year.

Secret Nostrums—The Testimonial Fraud.

By Samuel Hopkins Adams, of New York City.

In the brief time at my disposal I cannot do justice to the subject of proprietary medicines in any general sense, so I shall deal only with a single phase of the industry.

There is one ingredient common to the whole patent medicine business —the testimonial. Attack a nostrum and it thrusts forth its endorsements from the people. Say of Peruna that it is nothing but alcohol and water; say of Liquozone that it is a weak solution of sulphuric acid, and harmless only in proportion as it is ineffectual; say of the consumption cures that they deceive the unfortunate by an effect that is temporarily soothing and permanently baneful; say of Orangeine, antikamnia and the other acetanilid headache powders, that they are both dangerous and debilitating; say of any advertised cure-all or specific in the whole list that in its very nature it must fall ludicrously short of its flagrant claims, and its resort is to wave aloft its careful hoard of letters, and cry: "We rest on the evidence of those we have cured." Very well, let us inquire into the nature of this testimony. First of all, most nostrums make a great point of the mass of evidence. Thousands of letters, they declare, all as convincing as those they print, are in their files. It is true that the widely advertised proprietaries receive a vast bulk of mail, but 99 per cent. of the letters wouldn't convince the most credulous mind. The remaining 1 per cent. must be eked out by other means. So the nostrum manufacturer makes an appropriation for testimonials. By this, I do not mean that testimonials are commonly bought for cash, although this occurs, too. Generally the payment is indirect. Agents are sent out around the country to secure signed statements. This costs money. Druggists get a special trade discount for obtaining and forwarding letters from their customers. This costs money. Persons willing to have their pictures printed (and vanity is a powerful ally of the nostrum trade), get a dozen photographs for themselves. This, too, costs money. Answers written by testimonial givers to letters of inquiry bring a price, 25 cents per letter, usually. Why all this expenditure if the nostrum manufacturers are overwhelmed with unsolicited encomiums? Duffy's malt whiskey purchases its documents direct from certain classes. Old age is its specialty. If any person in this audience is approaching ninety years of age, I think I can safely promise him $25 for a signed statement with photograph

to the effect that Duffy's malt whiskey, in combination with a merciful Providence, is responsible for his continued existence. Centenarians are quoted higher. By judicious bargaining, I believe, they could get $50 for the first century and $10 a year for each additional twelvemonth. Ministers of the gospel can find a ready market, too, and I regret to say that a few of them do so. Some years ago there was a testimonial agency in Washington which dealt in bargain sales. The manager once wrote to an acquaintance of mine, who manufactured some kind of a kidney fraud, offered him DeWolf Hopper, Otero, the dancer, and his pick of five Congressmen, from a list of twenty, all for $100. "This is the best thing on the market for the price," he wrote, "and I'll agree not to duplicate on you for six months." Whether he could really have produced the actor and the dancer, I am unable to say, but the Congressmen were undoubtedly a genuine offer, with the goods ready to show. One great advantage in this line of business is that the documents are genuine. The writer can't go back on them. Of course, they are worthless as testimony, once their true nature is understood, but the readers of patent medicine advertisements are not commonly of an investigating turn of mind.

Now let us turn to the letters that are both genuine and honest, of which the big patent medicine firms have large collections. These come from people who, having recovered from disease, attribute their recovery to the patent medicines they have been taking. Access to the original manuscripts is cheerfully given to investigators, because the proprietors are glad to prove the genuineness of the letters. I have looked at hundreds of such epistles and 99 per cent. of them are from illiterate and obviously ignorant people. Careful editing makes a few of them suitable for publication. The geographical distribution is suggestive. Out of 100 specimens selected at random from the book issued by the R. V. Pierce Company (Pierce's Golden Medical Discovery, a favorite prescription), eighty-seven are from small and remote hamlets whose very names are unfamiliar to the average man. Only five are from cities of more than 50,000 inhabitants. Now Garden City, Kan.; North Yam Hills, Ore.; Theresa, N. Y.; Parkland, Ky., and Forest Hills, W. Va., may produce an excellent brand of Americanism, but one does not look for a very high average of intelligence in such communities. Testimony of this sort, honest though it may be, can hardly carry great weight to a reasoning mind.

Medical or scientific testimony to the worth of patent medicines invariably withers under investigation. Take Liquozone, for example. The chemists who lend their support to it are mostly beneficiaries of the Liquozone company. Several of the physicians whose names are used in support of the nostrum's claims I wrote to. One was a veterinary, one was an advertising cancer doctor, one was a guide and cook for hunting parties. One spelled diabetes "debectes" and complained that his letter had been garbled, which was true. Another I could not get trace of. Out of the whole lot there was one genuine-appearing document—

a report on a bacteriological test, but the report omitted an important item. The verbal statement of the bacteriologist to the Liquozone agent that while Liquozone produced an effect in test tubes, it would be worthless or worse taken into the human system. Medical testimonials to so-called ethical remedies seem to be easy to get. A large firm of manufacturing chemists, who make a few nostrums of their own, which are advertised in the medical journals, write: "We are in constant receipt of testimonials (from physicians) regarding our various preparations which state that the writer, upon receipt of a suitable consideration, would gladly devote his time to a flattering and detailed description of the remedy mentioned." This form of emolument, I am told, is euphemistically referred to by the beneficiaries as being "paid for their time." Other testimonials come from back-woods doctors, who like to see their names in print and don't know any other method of attaining the desired end. Then again, the geographical distribution is interesting. Medical encomiums upon "ethical" remedies come from the same class of towns which furnish the familiar "God bless Peruna" letters in the daily paper advertisements.

Foreign testimony from men of standing is much easier to obtain than domestic. Why this should be so has puzzled me for some time, but I discovered the reason while investigating that remarkable fake germ-killer, Liquozone. The Liquozone Company announced that they had secured the services of Prof. G. Pouchet, of Paris, as their scientific representative in France. My first impression was that Professor Pouchet was probably another home-made myth like the famous German savant, Professor Pauli, whom Liquozone created and subsequently dissipated. Inquiry showed, however, that there really is a Prof. G. Pouchet, of Paris; that he holds a responsible position as head of a government laboratory, and that, although not a scientist of the first rank, he stands well professionally. Collier's sent its Paris representative to interview Professor Pouchet.

"Have you lent your name to any patent medicine, Professor?" asked the interviewer.

"I? No; I do not do that sort of a thing."

"Then the Liquozone Company is using your name without authority?"

"Ah, the Liquozone Company? That matter is in process."

"Then you are doing some work for them and they are authorized to use your name in America?" The spirit, if not the letter, of the learned Professor's next remark is best reproduced by the employment of a familiar American idiom—"America! I don't give a damn for America! Nobody knows one in America!" There, I fancy, we have the attitude of the average European specialist toward American patent medicines, which pay liberally.

The honest and unintelligent testimonial is an evil for which there is no remedy. But against the testimonial furnished by men of prominence in public life a very slight expression of public opinion would be effective. For instance, if every time Admiral Hichborn's name appears in

a Peruna advertisement a dozen such people as make up this gathering to-night would sit down and write him notes of inquiry I feel certain that no other nostrum could ever inveigle him. Admiral Dewey and Admiral Schley have had occasion to repent very mournfully their Peruna testimonials. Yet I have recently seen in the advertising of a certain drink cure, whose methods are, to say the least, dubious, the names of prominent Bishops and no less prominent clergymen of various denominations, not alone as endorsers, but as advisory governors. I venture to assert that more than half of them have never made the slightest personal investigation of the cure in any of its phases; in fact, I have thus far found only one who claimed to have any first-hand knowledge of the concern.

"The name is the man," says the French proverb. In this country we seem to regard our names as quite distinct from ourselves, and to lend them out with a generosity which would be considered sinfully reckless if applied to a five-dollar bill. When the public conscience shall have been a little more aroused we may hope for an expression of opinion that shall make our clergymen ashamed of the carelessness with which they lend their influence to doubtful enterprises and our legislators and public men afraid to sell, for petty political payment, their titles of honor to the use of fraud and poison as exemplified in proprietary nostrums.

Address on Organization of an Anti-Tuberculosis Campaign.

By Livingston Farrand, M.D., Executive Secretary, National Association for the Study and Prevention of Tuberculosis.

Mr. President, Ladies and Gentlemen: Before coming here to-night I had not a very clear idea as to the conditions and organization of this Association, and consequently have not prepared an address, but shall speak in a perfectly informal manner. It seems to me that, as a representative of the National Association for the Study and Prevention of Tuberculosis, I can do nothing better than to make an appeal to you, as representatives of this Sanitary Association, to join us in the movement to fight tuberculosis in New Jersey. Let me state, very briefly, the aims of the National Association.

That Association, as you probably know, was organized about a year and a half ago. After several attempts to form a national society for this purpose, the leading men interested in the movement met in Baltimore, under the auspices of the Johns Hopkins University, and discussed plans for organization, the idea being that the new organization should be medical. In June, 1904, at Atlantic City, following out the plans of the Baltimore conference, a meeting was called of representative members of the American Medical Association, to organize the National Association for the Study and Prevention of Tuberculosis. This was done, and officers elected, Dr. Edward L. Trudeau being the first president. At this meeting for organization, a strong appeal was made that the work of the Association and its control and membership should not be confined to physicians, but should extend to the laity, as well. This suggestion met with unanimous approval on the part of the physicians, and the Association is to-day a union of the medical profession and the laity of the country in an organized fight against tuberculosis. Its objects are both scientific and popular. It aims to further every sound movement tending toward the prevention of tuberculosis. The practical work of the Association must, of necessity, deal largely with the matter of prevention. Prevention of this disease means the education of the people, and in accomplishing this end we are trying to operate through every possible agency.

Within the last fortnight we have been able to effect a close affiliation with the American Federation of Labor, which we regard as a

most important step. At the annual meeting of that body held in Pittsburg, we were able to have a committee appointed to join in this movement, and we hope, in the course of the year, to reach the two million and a half of laboring men represented by that body. We are also operating through such national bodies as the Y. M. C. A.'s, the Women's Clubs, etc., and trying in this way to reach every individual in the country.

Recognizing as we do that the tuberculosis problem is invariably a local one, which differs in different localities, but always includes the education of the people and the relief of those suffering from the disease, the National Association is endeavoring to form in every community of the United States some sort of an organization for the prevention of tuberculosis. This movement for organization is now progressing in a most encouraging way.

It is not necessary for me here to go into the details of the measures which such associations should take. What I wish to do is to urge the establishment of an organized campaign in New Jersey. This State is lamentably backward in the anti-tuberculosis movement. So far as I know, there is not more than one active Association for the Prevention or Relief of Tuberculosis in New Jersey. It is high time that the citizens of New Jersey should affiliate themselves with this crusade, which is now becoming world-wide. One reason why I am so glad to meet with your Association to-night is because you include, not only representatives of the medical profession, but of every profession which concerns itself with proper hygiene, public health and right living. You are in a position to give, by your endorsement, a tremendous impetus to efficient efforts to stamp out tuberculosis.

Mr. President, I make a specific plea to this Association to endorse formally a movement for the organization of anti-tuberculosis associations throughout the State of New Jersey. I do not know what your methods of procedure may be, but I beg that you lend your co-operation to this movement for the education of the people tending toward the stamping out of tuberculosis. It is unnecessary for me to dwell upon the actual conditions in the United States and in New Jersey. You are as familiar with them as I. The time is ripe for organized action, and I trust that it may be deemed advisable that some official action be taken by this association leading to that end.

Medical Inspection of Public Schools.

BY DR. FRED S. SHEPHERD, SUPERINTENDENT PUBLIC SCHOOLS, ASBURY PARK, N. J.

Were we in England we would need to word the subject of this paper "Medical Inspection of Schools and of Public School Children," in order not to be misunderstood. We understand the subject to include both public school buildings and children. There are three view-points from which this subject might be treated. The history of the medical inspection of schools, both in this country and in Europe, ought to make a very interesting article. It would seem to me a valuable subject for investigation by some member of this Association in the future. The subject might also be treated from the standpoint of our present-day practice both in this country and abroad. It would be worth while to know how extensive the medical inspection of public school children is in this country and the differing means and effectiveness with which it is carried out. A third manner of treatment is to set forth various general considerations, both theoretical and practical, for possible discussion here. The time will not permit the combinations of the three methods of treatment. I shall, therefore, confine my remarks to the last phase of the subject.

A voice is occasionally heard disputing the right of the State either to require or to permit the medical inspection of children in schools. It would seem, however, that the State is justified, not only in permitting school boards to institute medical inspection in schools, but in obliging them to do so. Our present State law would better read, not with the permissible "may," but with a mandatory "shall." When we consider the importance of the subject, both from the standpoint of the individual and from the standpoint of the State, we may wonder that public school authorities generally throughout our country did not institute medical inspection of schools long before it was thought of and put into practice.

Even if compulsory education were not nowadays a general fact, parents could and should claim, as taxpayers and supporters of the public schools, that these schools should, from the standpoint of health, be a safe place for children to attend. We have heretofore proceeded upon the theory that only the parent is responsible for the health of his children, and that the State should, therefore, incur no expense in discovering whether or not the physical conditions of a child warranted his presence in school. This right of parents to the protection in schools to the health of their children school boards have always

recognized by closing the public schools in times of serious epidemic, and also by conforming to the well-known laws of sanitation both in the construction and in the care of public school buildings. The fact that parents have not insisted on their right to medical inspection in public schools as a safeguard for all does not militate against their claim to the right. Not only, however, has the parent the right to claim such protection for his children in school, but the child himself has a claim which the State and his parents are bound to recognize. He is the future citizen in embryo. Upon his vigor will largely depend his future success in life and his economic value to the State. When a State, therefore, establishes free schools the conditions obtaining in them should be made to promote in every way possible, not only the mental growth and strength of the individual, but also his physical development and hardihood.

If now there is any force in these two points of view, how much greater strength do they present, when we reflect that school attendance is now in this State, and in most States, made compulsory upon all children from five to fourteen years of age. It cannot be right to compel children to attend school and wrong to determine whether they are physically fit to meet the strain imposed. It cannot be right to compel a child to go to school, and impose upon him the full requirements of the school, when he is only able physically to carry part of them. It seems, therefore, a corollary to the principle of compulsory education that the school authorities should determine first of all the physical fitness of every child of school age to attend school. The State has, however, a larger duty than this. The purpose of public education is to fit the future citizen to discharge rightly and vigorously his civic duties. To compel him to spend a large part of nine years of his life under conditions that might unfit him for future usefulness would certainly be false economy on the part of the State, if not criminal. It, therefore, devolves upon the State, represented by public school authorities, to make the conditions of school life favorable to the highest and best development of the young, physically as well as otherwise. Parental objection to medical inspection in schools is, however, occasionally encountered. The parent who is as careful of his children's health and physical condition as he is of himself, and who, through medical advice, is conversant with their physical condition, can say with right that it is unnecessary to examine his children. This is the objection most frequently met with. It is valid. If all parents were as intelligent and as careful as are some, medical inspection of school children under the directions of school boards would not be necessary. There is, however, a legitimate answer to this objection, namely, that the purpose of establishing the proportion of the defective and non-defective, the healthy, strong, sound child counts for just as much as one not so. Certain it is, that such examination cannot injure any child who may not need it. Parents, however, are found to be generally very reasonable on this point, and when such cases are properly handled, both by medical inspector and by school authorities, there is little trou-

ble in overcoming the objection. Some say that the policy of school medical inspection tends to weaken parental responsibility in the matter. This is a weak statement. It is a well-known fact that most parents, though solicitous for the welfare of their children, are quite unable to judge as to their physical condition. A very large proportion never send their children for an examination to a physician, and so long as they do not actually become sick, would consider such procedure unnecessary; in fact would not think of it. Yet we know that there are multitudes of children with defective vision, or imperfect hearing, or diseased lungs, or weak hearts, or curved spines, or bronchial affections, that not only incapacitate for school work, but will, if neglected, eventually unfit for civic duties. Medical inspection does not remove responsibility from parents, but supplements and stimulates it. Numerous are the expressions from parents of gratitude to the school authorities for having called attention to physical defects in their children, of which defects the parents had been totally unaware.

The organization of medical inspection in schools is a matter which ought not to give very much trouble. In the countries of Europe the proposition to have medical inspection in schools met with a good deal of opposition on the part of educational authorities. The fear was that the medical inspector would assume too much authority over the course of study, the hours, and even the methods of instruction. I have yet to learn of any such apprehensions on the part of educators in this country. As a matter of fact with us, medical inspection of schools is, I take it, most welcome. It is so because it assists the teachers in a responsibility which they are able to discharge with little efficiency. In the second place, it gives to the teachers a greater assurance that they are directing their efforts wisely in the interest of the child. It stands to reason that a proper medical inspection of schools should be in the hands of expert general practitioners. No amount of school hygiene, or general hygiene, as taught in our normal schools or colleges, would equip a teacher properly to examine the children under her care. The more expert and experienced the ability in this department, the better the work presumably will be done and the safer will the children in school be, assuming, of course, the medical inspector is otherwise efficient. Again, if the system is to work harmoniously, the medical inspector should work under the direction of the superintendent of schools, as do the teachers. If the medical inspector should regard himself as not called upon to accept any suggestions whatsoever from the school officers of administration, such as superintendents or school principals, it is plain that friction might arise. In this connection we should not overlook the fact that medical inspectors are human, and have a few of the faults common to humanity. It is possible for them, as it is for teachers and others higher in authority, to slight their duties or to perform them in an inefficient and unsatisfactory manner. School boards are not able to pass judgment upon these inner workings of the system, and somebody should have the responsibility for holding even medical inspectors, if necessary, to the letter, if not to the spirit of

their obligations. It would be unwise, however, for a superintendent of schools, or for the principal of a school, to undertake to interfere with the medical inspector in any of his diagnoses. He is responsible for the health of the school, and should be strictly held to accountability therefore. In matters of system, however, it is proper that he should listen to the head of the school. In other words, his relation to the head of the school would be similar to that of the special teacher. On the other hand, wise administrative officers will accord to the medical inspector the deference due him in matters of medical judgment.

It has been suggested in some quarters that medical inspection of school children should be one of the functions of the local board of health in order to prevent clashing of authority. As boards of health are organized in our own State, however, I can see no likelihood of such cross-purposes. I presume it does devolve upon local boards of health to inspect, for sanitary purposes, all public buildings, including the public schools. This, I judge, is also, or should be, one of the duties of the medical inspector. To have the public schools inspected independently by two such departments seems to me a good thing—what one might overlook the other might see. Aside from this apparent overlapping of jurisdiction, I see little opportunity for any clashing of interest. On the contrary, it is possible for the very closest relations to be established between boards of health and the school medical authorities. How it might be in other cities of the State I am not aware, but in the city of Asbury Park every case of contagious or infectious disease is reported immediately by the board of health to the school authorities and vice versa. In this way the spread of school epidemics has been checked. It is difficult to see how the health of the community could be more efficiently promoted, even if the inspection of the school children were in the hands of the board of health. The efficiency of the arrangement, where the board of health is efficient and conscientious, rests rather with the medical inspector of the schools. If he is alive and active and wise in his judgment, it is quite possible to head off epidemics. The executive officers of city boards of health give their whole time to the work. Unfortunately, the medical inspectors of schools give only an hour or two a day, and that usually in the morning, leaving the afternoon hours without any opportunity on the part of teachers to refer any suspicious cases to the medical inspector. Any lack of oversight, however, is likely to be the fault of the school rather than of the board of health. If boards of health were to conduct the medical inspection of school children it would be necessary, of course, that a practicing physician should be attached to the board of health for this purpose. In my judgment, this sort of organization would lead to more friction than the present one. It would probably be less easy for school authorities to offer any suggestions, or direct in any way regarding the system best suited to the conditions of each school.

I offer for consideration here the proposition that medical inspection of public schools should be made by State enactment, compulsory

upon all districts. The reasons for such a proposition are those which justify, in the first instance, the medical inspection of school children. We are all aware of the fact that there are district boards of education who do not realize the importance of this long-deferred and most-essential feature of our public school work. While our State law permits all school boards to establish medical inspection in the schools, it seems to me, however, wiser to require it. It would seem also wise that in each district large enough to warrant the arrangement, there should be one chief medical inspector of schools, who should have general direction of this work and to whom the other medical inspectors should report. It is possible and even probable that in some districts one medical inspector would be sufficient. In those districts having a superintendent of schools the chief medical inspector should report to the superintendent. In those districts where there is no superintendent of schools the medical inspector should report to the county superintendent. Reports should be transmitted, as is now done with all other school reports by the school authorities mentioned, directly to the State Department, and a duplicate copy of all medical reports should be sent to our State Board of Health. Especially should such reports reach the State Board of Health for reasons which I now set forth.

In the first place, the State Board of Health is, or should be, the final authority to whom to refer all matters of public sanitation, including even the inspection of school children. Unless I am mistaken, the primary function of the State Board of Health is to conserve in every way the healthfulness of the State. If the State Board of Health, as at present organized, should not be able to tabulate and analyze the mass of statistics which would be furnished by the school medical inspectors throughout the State, it seems to me the State Board of Health should be enlarged to include a bureau of medical or vital statistics, whose function should be to gather and tabulate all data bearing upon the health conditions of the State, and to draw therefrom such general truths, or principles, or facts as the careful study of the data would disclose. I wish my medical knowledge were sufficient to enable me to express adequately the idea of which I have a glimmer only. Perhaps the State Board of Health are already aware of the diseases peculiar to various sections of our State; diseases such as I believe physicians term "soil diseases"; diseases that seem to find their promoting causes in the physical environment. Reports of the local medical inspectors would, or should, undoubtedly show the proportion of various diseases to which the children of any community are subject. From such statistics it would be possible, it seems to me, to establish with much more certainty the health conditions of all parts of the State than can now be done. Again, the handling of all the medical statistics of the State by one bureau would throw undoubtedly a great deal of light upon the sociological conditions of various sections of the State by reason of the comparisons that could thus be made. We accept, perhaps, without concrete proof, the general truth that the housing of children has a decided bearing upon their health and development. The

comparison of medical statistics for the southern half of our State, for example, with those of the more populous and congested portions, would undoubtedly bring forth some very interesting and very important and practical truths. The analysis and study of such statistics might throw a light considerably more certain upon the relations between the health of children and the occupations of their parents. It would also be a stimulus to all communities to see their position in comparison with the healthfulness of other communities. While it may be said that such comparisons are now possible with present statistical knowledge, I leave it to the judgment of medical men to decide whether the data to be derived from the medical inspection of school children would not give a more positive and accurate knowledge than we have at present.

If the organization of medical inspection of schools in this State could be brought about with its apex in the State Board of Health, would it not be possible for the physicians of said board, or for a body of physicians such as said board might gather together, to devise a schedule of examinations to be made for recommendation to the schools of the State, in order that there may be gathered statistics of some uniformity. I believe the school boards of the State would be very glad to receive any suggestions or assistance of this sort. Dr. W. Leslie McKenzie, the medical inspector of the local government board for Scotland, in his recent work on the medical inspection of school children, published in 1904, in Edinburgh and Glasgow, by William Hodge & Company, gives a schedule of observations which should be made by the medical inspectors of schools. I give the main headings of this schedule, with sub-headings:

First—Address of pupils, occupation of parents, etc. Under this heading is included the date of the opening of school, date of medical inspection, name of the pupil, date of his birth, the place of birth, his age in years and months, residence, number of rooms in his home, number in family and of lodgers in the house, father's occupation, mother's occupation, whether the pupil works before or after school hours, and, if so, at what occupation. Second—His class rating, including his position in the class, number in the class, whether the child has been improving and the teacher's opinion of the child's mental capacity. Third—school attendance, whether regular or irregular; the number of possible attendances the previous year, the actual number of attendances the previous year, the actual number of attendances of the pupil the same year; if his attendance is irregular, the causes of irregularity; if from illness, the disease and whether attendance has been improving. Fourth—Physical exercise in the school-room, whether systematic or not and of what duration daily; on the play-ground, the forms of exercise there, including games and the approximate duration of same; in the gymnasium, the forms of exercises there, their daily duration, whether the instructor is always present; what field games, if any, and their weekly duration; also whether breathing exercises are taught. Fifth—Personal appearance. Sixth—Cleanliness. Seventh—Measurements:

weight, with usual indoor clothing, but without boots or shoes; height, standing, without boots or shoes; girth of chest, taken with greatest inspiration and greatest expiration; the average of both. Eighth—The teeth: Cleanliness; whether good, medium or bad; whether brushed daily; number of permanent teeth visible above the gums; irregularity of same; shape of same; number of decayed teeth; whether in the first set, or second set; the number of second teeth lost in each jaw. Ninth—The eyes: Color; color preception; keenness of vision, determined by Sneller's type; refraction of the eyes, whether any squint is present, whether convergent or divergent; also other diseases or any deformities of the eyes or eyelids. Tenth—The ears: Keenness of hearing; diseases of the ear. Eleventh—Nose and throat: Whether a mouth breather; diseases, such as enlarged tonsils, catarrhal tonsilitis, ulceration, pharyngitis, adenoids, or other nasal obstructions, elongation of the uvula, enlarged cervical glands. Twelfth—Deformities, whether congenital or acquired. Thirteenth—Diseases: 1st, skin; 2d, glands; 3d, bones; 4th, joints; 5th, heart (examined with reference to its regularity, valvular condition and pulse character); 6th, lungs; 7th, abdominal organs; 8th, other diseases or injuries; 9th, vaccination. Fourteenth—Other observations; for example, with regard to feeding, clothing, etc. It is plain that this schedule provides for a much more thorough examination of each individual than is common in most schools of this country, and is such an examination as bears particularly upon the ability of the child to do the work required by the schools. These examinations also bear largely upon what the schools can do to correct any defects or deficiencies found. It is probable that this schedule will be thought by many to be too complete and beyond the possibility of medical inspectors to fill out each year for any considerable number of pupils. The schedule question superintendents and school boards would like to have settled for them by a competent body of experts.

There are certain phases of administration open to discussion.

The question of the character of the examination raises another problem. What should be the character of the information reported by the medical inspector to the home? In some communities the character of the defect or ailment is stated openly to the parent, with the advice that the parent consult the family physician. In other places word is sent to the parent that symptoms of illness having appeared in the child, the family physician should be consulted and no specific trouble is stated. Which of these two modes of procedure is the correct one? It is my conviction that the parent should understand directly from the medical inspector what he considers to be the trouble. My reasons for this are as follows: Since the parents, as taxpayers, are defraying the expenses of medical inspection in our schools, it seems to me they have a right to know from the medical inspector what he considers to be the trouble with the child. The fact that he advises them to consult the family physician prevents any interference with the other practitioners. On the other hand, failure to report to the par-

ent the nature of the specific trouble is likely to work in two ways. It may lead to inquiry of the medical inspector by the parent as to the nature of the specific trouble, causing thereby a loss of time for both parties, or it may be treated by the parent as not of a serious nature, since he himself can see no defect in the child, and the good advice given may not, therefore, be acted upon. If, however, the specific nature of the difficulty is stated in the medical inspector's notices to the parents the advice that the matter be referred to the family physician is, in my judgment, much more likely to be followed, and the information given will be much more satisfactory to the parents.

In this connection I think it should be one of the duties of the medical inspector to re-examine from one to several times during the year any children found physically defective. The law now requires one examination. This law, I think, should be supplemented by by-laws of boards of education requiring of the medical inspectors as many supplementary examinations of the physically defective as may in his judgment be necessary to determine whether the child is receiving medical attention and growing stronger or not. Only thus by careful and repeated observations of such cases can the medical authority in the school determine whether the child is being properly looked after, and does it not devolve upon boards of education, through their medical inspectors, to determine whether school children needing medical attention are being properly cared for? It is probable that some families, either through ignorance, poverty, or wilful neglect, will fail to respond to any notices from the medical inspector. Does not the State, in such cases, owe a responsibility to the child, even though declining to assume the responsibilities of the parent? If the State is to compel such children to come to school the children certainly can claim from the State some consideration for their physical fitness. Some go so far even as to affirm that, not only should the medical inspector disclose to the parent any physical defects which he may discover, but that he should also direct the remedy. Possibly so, but in exceptional cases only, such as families too poor to engage the services of a physician. Otherwise, what is to become of the child who needs the services of a physician and whose parents have not the means to procure one?

The law now prescribes that the medical inspector shall keep the record of each examination made of each pupil each year; that such record shall be filed away as directed by the boards of education. Such records are usually available to the medical inspector alone. The teachers get the benefit of the examinations only through such report as the medical inspector may see fit to give to the class teacher regarding any particular individual. It would be an improvement in administration if the record of each pupil could be kept in the class-room, after the case had been disposed of by the medical inspector, and each record carried along each year with the pupil from class to class, so that each succeeding teacher would have the benefit at the beginning of each year of all information ascertained previously regarding each pupil in her room.

The question growing out of experience is whether pupils affected with any contagious or infectious diseases not in the list of those notifiable to the boards of health should be excluded from the public schools. It seems to me that there can be but one answer to this question, and that is that all such diseases should result in immediate exclusion from school, and in the exclusion from school of all who may have been infected so far as it can be ascertained. To be sure, there are certain infectious diseases, or contagious diseases, which the physicians do not consider dangerous in the community. It is true that such diseases very often require the attention of the physician. It is true that the schools are the very best place in which to disseminate broadcast throughout the community any children's diseases, whether dangerous to life or not. To follow the same rigid policy regarding those affected with these so-called non-dangerous ailments, as is followed in the case usually of those affected with dangerously contagious diseases, would be likely to lessen the spread of the disease and possibly curtail the business of the practitioners. I have had it said to me: "The children will get these diseases anyway, and they might just as well have them one time as another. Why, therefore, seek to protect those not having these diseases from those that have them?" It seems to me that this view of the case overlooks completely, or minimizes the fact, that it is much better for a few to suffer loss of time due to exclusion from school than for a whole class, or even a whole school to be exposed to disease, with the possibility of illness and absence from school for weeks. In other words, the loss of a few weeks by two or three pupils is nothing as compared with the loss of the same time in school by dozens of pupils. It is much better, if there is any hardship worked, that it should be suffered by the few than by the many, and why should the parents be subjected, when unnecessary, to any inconvenience in the matter, to say nothing of the additional expense for medical service? More than that, the breaking up of the school attendance is, from the school standpoint, a very serious thing. It seems to me, therefore, the wisest policy, from the standpoint of school administration, that *all* infectious and contagious diseases should subject the children ill, and those exposed to the infection, to exclusion from school until the danger is known to be past. For this reason, why would it not be better for boards of health to require that *all* infectious and contagious diseases be reported to the board of health, whether they are considered to be of a dangerous character or not? If this were done a great loss of time would be saved to the schools, and many cases of illness and many a doctor's bill would be saved to the parents. It goes without saying that no system of medical inspection would be wisely administered unless the medical inspector each year carefully instructed the teachers regarding the symptoms of contagious diseases and other points of school hygiene. I believe the law makes this incumbent, and it is a very wise provision.

It is money and time misspent if the medical inspector of a school is not efficient, systematic and entirely conscientious. There is a rare

opportunity afforded to medical inspectors to do slipshod work in the way of weak superficial and hurried examinations and diagnoses. He should, with the principal of each school, devise a careful system of records and of communicating his findings to the teachers, which can be followed without too much red tape. If teachers are not properly informed by the medical inspector of the physical condition of the children, whom they teach, the value of medical inspection to the schools at least is greatly reduced. It follows, I think, logically, from the principle that medical inspection of school children should be established in all schools; that our schools should be provided with good gymnasiums, with especially trained teachers of physical culture to conduct them. Comparatively few schools of our State have them. If we, however, compel children to come to school between the ages of five and fourteen, and find them with physical defects, or deformities, which can be corrected by proper physical training, it seems to me the duty of the State to provide the means with which the schools may correct such deficiencies. If education means nothing more than the training of the mind, if it does not also include the training of the physical powers as well as of character, then the position that gymnasiums are necessary in connection with all schools, is not well taken. But if education does include the production of a sound body, as well as of a sound mind and character, then certainly we cannot escape the logical conclusion that our schools are still inadequately equipped for the discharge of this responsibility.

We have in this paper justified the policy of medical inspection of public schools. We have made some suggestions with regard to the organization, whether local or State, of this work. We have presented some phases of practical administration of the system, including the general duties of a medical inspector. Let me close with a statement of the objects of routine medical inspection of school children as conceived by the medical authority above cited: "The ultimate object of systematic inspection is to eliminate from the schools all those unfit to profit by the education given there; to discover all those unfit to proceed at the standard pace; to enable the teacher to arrive at a classification strictly in accord with intelligence and staying power; thus to make it possible for the feeble children to receive special treatment, and for the vigorous children to have the advantage of their vigor; to point out the remedy for defects, when defects are remediable; to point out the danger from defective organs; to guide the teacher in the selection of methods of physical training; to test its effects from time to time; to devise methods of training applicable to the physically enfeebled, or defective; to scrutinize the children from every form of epidemic disease, specific or parasitic; to direct the measures advisable in every case of disease discovered, whether it be defective vision, defective hearing, enlarged tonsils, nasal obstructions, or any other defect, deformity or disease, and, generally, to discover, prevent or remedy all such diseases, deformities or defects as may impair school efficiency, and may be capable of remedy or mitigation."

Discussion on Medical Inspection of Schools.

By Dr. A. B. Poland, Newark, N. J.

Mr. President, Ladies and Gentlemen: I have listened with much pleasure to the very interesting and instructive paper of Dr. Shepherd. But I cannot agree with Dr. Shepherd that we need more laws. I think we have laws enough; that we do not need to go to the Legislature for more laws to secure efficient medical inspection. Many school districts do not take advantage of the law we already have. As an illustration, the city of Asbury Park, so progressive in other respects, has not, I believe, made vaccination compulsory. In the city of Newark we have, in fact, for years made vaccination compulsory. We are doing something now that, I dare say, no other city has attempted, because the law seems not to give the necessary support. The State law, as you know, merely authorizes boards of education to refuse to admit to school those who have not been "duly" vaccinated. Our board of education has gone further and has construed "duly" to mean *successfully* vaccinated. Attempts at vaccination won't do; to be of any use attempts must be successful. For a number of years our board of education has tried to enforce the law with the utmost rigor. No child has been admitted unless he presented a certificate from a physician stating that he had been vaccinated on such a date, and that ten days later he had been examined, and that his vaccination had been found to be successful.

One of our own medical inspectors, on his own initiative, examined the arms of the pupils in four schools. All of these pupils had physicians' certificates of successful vaccination. These certificates were on file in all cases, and yet on examination of scars ten to seventeen per cent. had no scar at all. This investigation opened our eyes. The board of education and the board of health got together and decided to do away with physicians' certificates, since it was now demonstrated that they could not be relied upon. A rule was adopted requiring medical inspectors to *examine the arms of all pupils* now enrolled in the schools. Four weeks ago our medical inspectors began this examination. Principals, teachers, pupils and janitors throughout the city were required to come under the rule. The whole numer of pupils examined by the medical inspectors was 43,242. Of these 40,442 were found to have satisfactory scars; 2,800 unsatisfactory; 1,081 as having unsatisfactory scars; 906 as having no scar. Eleven hundred and six have been vaccinated by medical inspectors up to date. One hundred and eight pupils had previously had small-pox. There are eighty-three

cases only of those who refused to comply with the rule. This is less than one-fifth of one per cent. of the whole number of pupils enrolled.

I have just sent out a letter to principals requesting that all of these eighty-three children should at once be refused permission to attend school until vaccinated. Will the parents of any of these eighty-three children choose to attack the law in the courts? We don't know. We do not care if they do. If the law is defective, let it be amended. Instead, therefore, of looking for more law to secure effective vaccination and effective medical inspection, let us take the law we have, and do the best we can with it. The medical inspection of schools in this State began, I believe, in Paterson. In organizing that system, the plan of dual control, *i. e.,* control by both board of education and board of health was recommended by me. This plan was later adopted in Newark. It has been successful. In Newark we have twelve medical inspectors, who receive $400 a year. The board of education appoints and pays them. The board of health directs and controls them. The health officer of the board of health receives a report from the medical inspectors daily. The health officer and superintendent of schools have a perfect understanding. No medical inspector can exclude a child from school. It is the principal's duty to exclude pupils. The health officer controls the inspectors; the city superintendent controls teachers and pupils, and there is no clash of authority. As an illustration: Day before yesterday, a principal reported to my office a case of scarlet fever. Within three minutes the medical inspector made a similar report to Mr. Chandler, the health officer, who telephoned me. Orders were issued to close the school at once. There was no loss of time and no conflict of authority.

We have added to the duties of our medical inspectors from time to time during the last four years. Our medical inspectors were first directed to examine children isolated by the teachers. But they said, after a while, that they wanted to get into the school rooms and see the children. So we require them to do it once a month. Now they examine pupils, who are isolated by their teachers, daily for contagious disease, and once a month all pupils for physical defects.

We have established a new mode of dealing with alleged cases of insusceptibility to vaccination. Parents frequently allege that a child has been vaccinated before and found insusceptible. All such cases are referred to a special committee, made up of the chairman of the committee on health of the board of education, the health officer of the board of health and the superintendent of contagious diseases. Their decision is final.

Another rule adopted by our board is that pupils must be re-vaccinated when they enter high school, unless they have been vaccinated successfully while attending the grammar schools.

What Methods are Most Suitable for Disposal of Sewage on the Atlantic Coast.

ADDRESS BY GEORGE W. FULLER, C.E., NEW YORK CITY.

MR. PRESIDENT, LADIES AND GENTLEMEN—The keen interest which this Association takes in all sanitary subjects has resulted in discussions on several occasions of the important topic of sewage disposal. Last year and the year before there were especially interesting papers and discussions by several prominent workers in this branch of sanitary engineering. Those papers and discussions have appeared in the Proceedings of your Association, and it seems to me needless to-day to speak in much detail of those methods which have long been the leading procedures for the final disposal of those domestic wastes which are removed by water carriage in pipes underground. During the past two years there have been a number of notable additions to the evidence upon this subject. It is my purpose this morning to speak briefly of these lines of new evidence, and to say a few words as to practical conclusions which are now available.

The first feature I will mention is in reference to shellfish pollution and the reports of the Royal Commission on Sewage Disposal for Great Britain. As you may know, that commission has been at work since the spring of 1898, and it has conducted experiments and has issued reports at intervals for about five years. The report which was issued some eighteen or twenty months ago was devoted to the infection of shellfish, to the pollution of seacoast water and to the life of disease germs, such as typhoid fever, in shellfish and in coast waters. This is of course a subject which was entered into to a considerable length in the meeting of last year, but I wish to call your attention to the fact that some of the British shellfish are taken from waters which are not above suspicion as to sewage pollution. In London and Manchester it has been concluded, after careful investigations, that about eight per cent. to ten per cent. of all typhoid fever in those cities has for some years been caused by infected shellfish. In several seaport towns the proportion has reached over fifty per cent. Although a commission has been working on this subject for several years, many practical features are still unsolved. These unsolved problems relate especially to those cases where the pollution is slight or occurring only at intervals. Where the pollution is excessive or absent, the treatment is obviously simple.

I also wish to call your attention to the work which has been conducted by the Massachusetts State Board of Health during the past two or three years with reference to shellfish and sewage disposal,

especially on the seacoast. This board has since 1886 devoted sums ranging from $20,000 to $35,000 each year for work in matters of water supply and sewage disposal within the limits of that State. You are all familiar, of course, with the investigations made at Lawrence, where an experiment station has been maintained for nearly twenty years. You are also aware of the fact that all improvements in the cities and towns of Massachusetts with reference to water supply and sewage disposal have first to be passed upon favorably by the State Board of Health before the Legislature gives permission to issue the necessary bonds. After progressing some fifteen to eighteen years along this general line, the Massachusetts Legislature directed the State Board of Health to make special inquiry as to shellfish, and also as to the manner in which sewage was disposed of by all leading cities and towns of the State. On this subject the recent Massachusetts reports contain most valuable evidence.

In regard to disposal along seaport towns, there is necessity of improvement in the majority of instances. With few exceptions the sewage is disposed of by dilution. It is conveyed to bodies of salt water, such as tidal streams or bays or other arms of the sea. This method of disposal in a majority of instances, when well carried out, has been found to be reasonably satisfactory from the standpoint of avoiding general nuisances. It is capable of being better applied in many instances, not only along the Massachusetts seacoast, but along the entire Atlantic coast. One of the least satisfactory features in the disposal of sewage by dilution is that the sewage is not brought quickly enough to the deep water where adequate currents exist to disperse the sewage. There is a tendency in many places to allow the outfall sewers to stop on the flats exposed at low tide, or in shallow water, rather than to convey the sewage to deep water, where the outlets are suitably located and submerged at all times. The method of disposal by dilution has of course a different phase when it involves the pollution of shellfish, which makes it a proposition requiring special consideration. This method of disposal is not such a barbarous practice from the standpoint of eliminating nuisances as one might imagine, when compared with the disposal of garbage and with the ventilation of public and private dwellings.

In the disposal of sewage by dilution it is necessary, as already stated, to see that the sewage is thoroughly and quickly dispersed throughout the body of water in which it is diluted. It is probable that the portion of New York City on Manhattan Island is the best located city in the world for the disposal of sewage by dilution. That does not mean necessarily that it is perfect, but by extending the sewers out to or beyond the pier lines, and having the sewage discharged well beneath the surface of the water after screening from it all coarse solid particles, there results a method of disposal probably unsurpassed both in regard to cheapness and to lack of offensiveness.

Where the question of shellfish is not a factor, dilution will no doubt continue for many years to be the most prevalent method of disposal.

It is obvious from available evidence that there is much room for improvement at present, and that current practice will be much modified. With the removal of suspended particles of visible size, there are still left for consideration in large projects the questions of odors and of sleek, which is the thin film of grease upon the surface of the water in the vicinity of the outfall. As the volume of sewage discharged at a single point increases, the importance of these factors also increases. How much sewage can be discharged through a single outfall is still a more or less debatable question. At the Deer Island outlet in Boston Harbor about fifty million gallons of sewage are discharged daily. Odors are rarely, if ever, noticed at a greater distance than one-quarter of a mile, which is generally stated as the limit to which odors can be detected in the neighborhood of large modern purification works in Europe. The sleek on the surface of the water in calm weather can be seen for a mile or so. Means for the removal of the grease producing this sleek, and for aerating the sewage to reduce odors, where these factors are objected to, are fruitful fields of investigation. Their accomplishment will no doubt be very much less expensive than that for complete purification.

Where shellfish is found in seacoast waters the sewage of neighboring cities should be disposed of according to the relative financial importance of the shellfish industry and of the purification of the sewage. Where the oysters and clams represent relatively small sums of money, then purification works will presumably not be built; the shellfish will be eliminated and the sewage disposed of by dilution. Where the shellfish industry is large and the necessary sewage works comparatively small and inexpensive, the logical thing to do is to purify the sewage thoroughly in artificial works along the lines required of inland cities where the quality of neighboring water supplies is a factor. There is also, of course, an intermediate class where local conditions must be most carefully studied before deciding between the shellfish and purification works.

There are various styles of works for the artificial treatment of sewage. The first of these methods which I will mention is sedimentation, which consists simply in allowing the sewage to flow through shallow reservoirs, holding ordinarily from two to twelve hours' flow. In these basins are deposited from fifty to seventy per cent. of the coarser suspended matters, and about the same per cent. of bacteria. Sewage purification by sedimentation is perhaps a misleading statement, for it is not purification in the full sense of the word. It is more properly clarification, in which there is a removal of some of the sludge or suspended matter. This is a reasonable thing to do, as it reduces clogging of the filter in which the sewage is finally purified.

The last few years have brought to the front the correct idea that sedimentation and allied methods are really preparatory treatments, and that they do not constitute by themselves a full purification process. Sedimentation is very similar to chemical precipitation, which is practiced in a few places in this country and in many European places,

except that efficient works of the latter type reduce the suspended matter and bacteria eighty to ninety per cent. Septic treatment, so called, is nothing more or less than plain sedimentation to which is added the practice of not removing sludge, but allowing the latter to remain for a long time on the bottom of the reservoir holding at least eight hours' flow, and to rot there. The rotting is nothing more than putrefaction by bacterial agencies. This putrefaction causes on an average about one-half of the total matter deposited from the sewage to become liquified and gasified. In that way the septic tank is a helpful preparatory step, as it puts the sewage in shape to be treated by some method of filtration more advantageously, and reduces the cost of sludge disposal.

The total organic matters in sewage are reduced about one-third by sedimentation and by the septic treatment, and about one-half by chemical precipitation. Effluents of all of these treatments are putrescible, and, as above stated, require subsequent filtration ordinarily, although there are cases, apparently, where any one of these preparatory treatments may suffice for the present in eliminating nuisances.

Intermittent filtration through sand is well known to you through the Lawrence investigations and the fifteen to twenty plants where this method is practiced in New England. Coarse grain filters have been developed largely in England, although they have been studied carefully at Lawrence and elsewhere in this country, and also in Germany. These filters, known as contact filters or sprinkling filters, according to the method of operation, have made a marked advance in matters of sewage purification, especially for cities not having near at hand suitable areas of porous sand.

For cities of small or moderate size where medium or coarse sand is readily found, the best method of purification is ordinarily intermittent sand filtration where an effluent of high bacterial purity is necessary or desirable. Where the filters are not overcrowded the resulting effluents are practically clear, odorless, and contain only about one per cent. of the applied bacteria. The organic matter in the sewage is reduced much below that necessary to secure a non-putrescible effluent. One acre of land disposes of the sewage of from 500 to 1,000 persons depending upon the porosity of the sand, care of filters, preliminary treatment of sewage, etc. Higher rates can be used, but it means more care and expense in keeping the filter surface free from clogging for winter work. Experience has shown that intermittent sand filtration is much more expensive than was thought to be the case some years ago. In fact, the experience of the last ten years in Massachusetts (see 1903 report of State Board of Health) with sand filters shows that the cost of these filters approximates, on an average, about forty-three cents per capita per annum, divided about equally between capital charges (five per cent. per annum) and maintenance. This cost has nothing whatever to do with the collection system of sewers in the city, nor with the conveyance or pumping of the sewage to the disposal works. It is solely for the purification of the sewage.

Where an effluent of high bacterial purity is not necessary, coarse grain filters give adequate results, so far as a non-putrescible effluent is concerned. These filters are cheaper than intermittent sand filters, where suitable sand is not readily available, and apparently, in some cases, also where such sand is found in the vicinity. The latter instances refer especially to conditions where the cost of delivery of sewage to intermittent filters much exceeds that for coarse grain filters.

One of the most important conclusions to which one is led by recent evidence from this country and abroad is that coarse grain filters have a field of usefulness where high bacterial efficiency is required. Contact filters, or sprinkling filters, are perfectly capable, in connection with a suitable preparatory treatment, to produce a non-putrescible effluent, containing about fifty parts per million of suspended matter, and about ten per cent. of the bacteria in the raw sewage. Such a liquid is comparable with a turbid river water which is highly polluted with sewage. In other words, coarse grain filters reduce a sewage to a state where it can be subjected to the treatment applied for the purification of drinking water from turbid and polluted rivers. Mechanical filtration, along the lines carefully worked out during the past ten years, is perfectly capable of converting the effluent of coarse grain filters to a state of bacterial purity fully equal to that obtained by intermittent sand filters. This combined treatment is apparently cheaper than intermittent sand filtration for large projects, even where sand is fairly accessible; for small plants there is probably no economy. Where the dividing line comes in conditions favoring one or the other of these methods of purification can hardly be stated at present. It is a topic, however, upon which much will be said in future.

The application of copper sulphate or other germicides to the effluent of coarse grain filters is another way of securing a final product of high bacterial purity. It is probably more expensive and no more effective than a final filtration as above mentioned. For small plants it is nevertheless of value.

Preparatory treatment of the raw sewage to remove the sludge is highly desirable for nearly all large projects. For small ones it is not necessary, where the sewage is treated by sand filters or sprinkling filters. Contact filters under all circumstances are operated to better advantage with a clarified sewage. Septic tanks are the best preparatory devices for ordinary conditions.

All of these remarks are directed to domestic sewage, containing only small or moderate amounts of trade wastes. Large quantities of trade wastes increase the difficulty and expense of purification very materially. Trade wastes vary so in their character that each case requires special consideration, and there is very little to be said in general terms.

As to the capacity and best type of coarse grain filters, much evidence is available from abroad, where such filters have been operated on a practical scale for six or eight years. Valuable data have also been

obtained in this country, both in practice and from test devices. The strength of sewage, climatic conditions, etc., are so different in America that foreign data are of less specific value for use in this country than are those obtained here. The city of Columbus, Ohio, has, in particular, secured valuable data on recent methods of sewage purification, and data which are of value for application also along the sea coast. I will say a few words about Columbus results, after making plain the differences between contact filters and sprinkling filters.

Coarse grain filters of all types should consist of firm material which will not disintegrate. Ordinarily, the filters are three to five feet thick —sometimes sprinkling filters are eight feet thick. All filters should be well underdrained. Contact filters are operated on the fill and draw plan. Sprinkling filters have the sewage applied to them in the form of a spray, either from revolving perforated pipes or from stationary pipes with nozzles. Contact filter material usually ranges in size from one-eighth inch to one inch, and that for sprinkling filters from one-half to two inches.

The city of Columbus, Ohio, voted two years ago to spend $1,200,000 in improving their sewerage system, including purification works. To determine the best method of securing a non-putrescible effluent at least cost, it was decided to devote $46,000, or approximately the interest for one year, to a series of tests of the local sewage. The testing station was commenced a year and a half ago, and was conducted for a period of one year. The results accomplished there are now in final shape, and are being printed in a public document, which will probably be available in a few months. These tests at Columbus show the results accomplished by more than forty different devices in various combinations. The relative amounts of sludge, organic matter and bacteria, which are removed by different methods of preliminary treatment, were ascertained. They also furnish a large range of data as to the best rates, kinds and grades of material, etc., for filtration.

In brief, it was found that the best preparatory treatment was afforded by septic tanks holding an average flow of about eight hours. This caused a removal of about two-thirds of the bacteria and suspended matter in the sewage. About one-half of the deposited sludge is liquefied and gasified. No trouble with odors was encountered.

Sprinkling filters, operated at an average rate of 2,000,000 gallons per acre daily, form the next step in the process. It was found that winter weather, even in the severe climate of Columbus, did not seriously interfere with spraying the sewage on the filters. A non-putrescible effluent was obtained, containing about ten per cent. of the original bacteria. Contact filters could produce an equal result when operated only at about one-fourth to one-third of the above-stated rate for sprinkling filters. Further, there is less clogging in sprinkling filters than in contact filters, due to the suspended matter retained as films within the sprinkling filter cracking and peeling when the filter is rested (every other week). This removal of stored suspended matter is one

of the chief characteristics of sprinkling filters. It makes the effluent somewhat unsightly in appearance, but this is readily corrected by passing the effluent through a small settling basin, holding two or three hours' flow.

A 20,000,000 gallon plant of this type was recently put under contract at Columbus for $435,000, exclusive of land and of force mains and pumping station for delivering the sewage to the works.

Disinfection as a Means of Restricting the Spread of Communicable Diseases.

BY HENRY MITCHELL, M.D., SECRETARY STATE BOARD OF HEALTH.

The opinions of sanitarians have undergone very great changes in recent years concerning the value of some of the measures designed to prevent the spread of infectious diseases, and a revolution has occurred in the practice of progressive health officers in the use of disinfectants. In a considerable number of diseases the nature of the infection has been learned, but very great difficulty, insurmountable thus far in the case of many affections, has attended efforts to trace the avenues through which the germs are conveyed to the patient, and the employment of a germicide will be of no avail unless its destructive influence can be brought to bear directly upon the infective agent. The purpose of disinfection is to destroy disease-producing agencies and to prevent their finding a suitable soil in which to multiply, but the limits within which well directed measures can be applied for the extermination of pathogenic organisms are extremely narrow. In tuberculosis, diphtheria, malaria, yellow fever, typhoid fever and certain other affections the infective organism has been identified, and intelligent and effective warfare can be waged against the transmission of these diseases by the employment of the recognized preventive measures. In the case of scarlet fever, measles, whooping cough, etc., all efforts at disinfection have thus far been empirical, for the specific cause of these affections has not been discovered, and we do not know with certainty just how these diseases are transmitted, nor how the germs may be most successfully attached. True disinfection, therefore, should be aimed at the cause of the particular disease with which we have to deal, and the materials employed and the manner of application will be quite different in different affections. For example, the infective agent in typhoid fever is known to be discharged from the intestinal canal and from the bladder, and disinfection to prevent the spread of this disease is effected by receiving all excreta in a germi-

cidal solution, and by subjecting garments and other infected articles to steam at a temperature of 240 degrees Fahrenheit in a suitable chamber for not less than thirty minutes, or by prolonged boiling or immersion in a germicidal solution. In diphtheria, where the infectious material is discharged from the nose and throat the procedure is altogether different, as it is believed that the dissemination of the infectious bacteria is commonly effected by moist particles floating through the air, as well as by soiled hands and other direct means of conveyance. Pulmonary tuberculosis, pneumonia and certain other affections are believed to be carried in the same way, and disinfection for the prevention of these diseases is directed to the destruction of the infectious material which is discharged from the diseased surfaces, and which find lodgement in the sick room and upon door knobs, stair rails and other places where infected hands can carry it. There is little reason to believe that the ceilings and those portions of the side walls of dwellings above the reach of the patient and attendants will retain infection, for if floating droplets of infected dust should reach these portions of the sick room, they will soon become dry and the bacilli will die. The floors, the woodwork which is within reach of infected hands, and the furniture, particularly all articles which have been touched by the patient, are the objects which are most liable to retain infectious substances, and it is against these objects that disinfection should be directed. But even with intelligent application of the most efficacious disinfectants the operator cannot always be sure that the infectious substances have all been rendered harmless. Disinfection, like curative medicine, aims to repair injuries already inflicted, and it would rarely be required if nurses and other attendants upon the sick would promptly deal with all infectious emanations in a manner which will immediately destroy their vitality. To practice room disinfection, according to the prevailing custom, after skillful and faithful bedside precautions have been taken, is not only useless, but meddlesome and indefensible. As ordinarily conducted by untrained persons, disinfection, so-called, is an humiliating exhibition, for too frequently the only information which the inspector has acquired relating to the subject has been forced upon him by the advertising circulars of parties who have apparatus to sell, or by traveling salesmen whose business it is to make customers of health boards throughout the country. From these and other equally unreliable sources inspectors of the class referred to have received statements which they accept as facts, and they go forth equipped with a handsomely-polished "generator" to disinfect dwellings in which sickness has recently occurred. Doubtless some of these officials really believe that the irrespirable gas which is liberated by the apparatus is destructive to all causes of sickness which may exist in the house, but in the case of others the opportunity to charge a fee is the first consideration, and but little thought is expended upon the efficiency of the operation. It is a conservative statement to assert that ninety per cent. of the disinfecting operations which are at present being conducted are of no value. This state of affairs is largely due to

the individualism which prevails in the public health service, and it would be corrected in great measure if the men who are entrusted with these duties could meet each other from time to time in order that all might learn the opinions and practice of those among them who are most experienced and capable. The views of theorists are liable to be quite as objectionable as are those of the unlearned, for no two sanitary problems are exactly alike, and rigid rules cannot be adhered to. Let us remember that the chief defenses which nature has provided to protect humanity against extinction by reason of infectious diseases are sunlight and fresh air, and let us humbly follow the instinct which is planted in every normal mind, and which prompts us to be cleanly in all of our habits and practices, for it is upon these influences mainly that we must depend for escape from the communicable diseases. In Circular 98, issued by the State Board of Health, is published a brief outline of the steps to be taken in preventing the spread of infectious diseases, and disinfection forms a part of the defense which is recommended, but the precautions which should be taken in the sick room have first place in the presentation of the subject.

RESTATEMENT.

1. It is the patient himself who is the source of infection, and the best sanitary service consists in isolation of infected persons.

2. Cleanliness in the sick room and immediate treatment by the nurse of all infectious substances will leave little for the official disinfector to accomplish.

3. When house disinfection is performed it should be done under the supervision of a person who is familiar with the effects of the disinfecting agent employed, and who has a clear comprehension of the objects to be accomplished.

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Rahway—Frederick W. Sell.

Red Bank—Edwin Field, M.D.

Riverton—Alex. Marcy, Jr., M.D.

Rutherford—S. E. Armstrong, M.D.

Short Hills—Stewart Hartshorn.

South Orange—John B. Duncklee, C.E., Spencer Miller.

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Titusville—A. W. Hartwell.

Trenton—J. B. Betts, William Elmer, M.D., James M. Green, Ph.D., George W. McGuire, R. B. Fitz Randolph, A.C., F.R.M.S., Judge W. M. Lanning, John C. Smock, Ph.D.

Verona—H. D. McCormick, M.D.

Westfield—J. B. Harrison, M.D., R. R. Sinclair, M.D.

Williamstown—Luther M. Halsey, M.D.

Woodside—Clyde Potts, C.E.

PROCEEDINGS

OF THE

Thirty-Second Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, Nov. 16 and 17,

1906

IN THE

Laurel-in-the-Pines House, Lakewood, N. J.

TRENTON, N. J.
MACCRELLISH & QUIGLEY, STATE PRINTERS.
[illegible]

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John B. Smith, Sc.D., New Bruns.

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Committees.

Publication Committee—David C. English, M.D., Chairman, New Brunswick; Henry Mitchell, M.D., Asbury Park; James A. Exton, M.D., Arlington.

Committee on Membership and Registration—Edward Guion, M.D., Chairman, Atlantic City; C. E. McLaughlin, M.D., Jersey City; B. V. D. Hedges, M.D., Plainfield.

Committee on the Organization of Anti-Tuberculosis Societies in New Jersey—Thos. W. Harvey, M.D., Chairman, Orange; Irwin H. Hance, M.D., Lakewood; D. C. English, M.D., New Brunswick.

Committee on the Education and Training of Health Officers—John L. Leal, M.D., Chairman, Paterson; B. V. D. Hedges, M.D., Plainfield; G. K. Dickinson, M.D., Jersey City; H. C. H. Herold, M.D., Newark; A. A. Woodhull, M.D., Princeton.

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CONTENTS.

Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers, and other citizens of our State interested in Sanitation as related to our homes, our schools and our municipalities.

Any citizen may become a member of the State Association on application to the Secretary or any membr of the Executive Council, on the day of meeting. The membership fee is **two** dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of methods relating to the prevention of sickness and the promotion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise, and preventing harmful, sanitary legislation, and also to aid the State and local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health, a part of the annual meeting is devoted to such special subjects as relate to the work of local Boards of Health. Every local board should have present at the annual meeting its Health Officer, Inspector or some other active member. The information secured for the benefit of each locality far more than compensates for the slight expense.

MINUTES

OF THE

Thirty-Second Annual Meeting of the New Jersey Sanitary Association,

November 16th and 17th, 1906.

OFFICERS, 1905—1906.

President,	H. M. Herbert, C.E., Bound Brook.
First Vice-President,	G. K. Dickinson, M.D., Jersey City.
Second Vice-President,	John B. Duncklee, C.E., South Orange.
Third Vice-President,	Wm. G. Schauffler, M.D., Lakewood.
Secretary,	James A. Exton, M.D., Arlington.
Treasurer,	George P. Olcott, C.E., East Orange.
Chairman Executive Council,	Rudolph Hering, C.E., Montclair.

The Thirty-second Annual Meeting of the New Jersey Sanitary Association was held in the assembly-room of the Laurel-in-the-Pines, Lakewood, N. J., and it was called to order at 4:20 P. M., Friday, November 16, 1906. In the absence of Rudolph Hering, C. E., Chairman of the Executive Council, the following remarks were made by Dr. Schauffler, of Lakewood.

Dr. W. G. Schauffler—On account of the absence of Mr. Hering it is my pleasure to welcome you again to Lakewood. Lakewood's welcome is an old story, but none the less sincere. The time has come for the opening of this meeting. There are no special announcements to be made, except to say that if any of the members of the Association do not find all they want here, if they will apply to the committee we will be very glad to do all we can to make them comfortable.

The meeting was then formally called to order by the President, H. M. Herbert, C.E., of Bound Brook, N. J.

The President—We are rather late in getting started, and we shall have to confine ourselves strictly to business.

The first items on the program are the reports of committees. We will now have the report of the Committee on Membership and Registration, by Edward Guion, M.D., chairman of the committee.

Dr. Guion presented the following:

Your Committee on Membership and Registration would respectfully submit the following report:

Your Committee has had printed a circular letter of invitation, as follows:

"NEW JERSEY STATE SANITARY ASSOCIATION, 1874-1906.

"DEAR SIR—The Committee on Membership most cordially invite you to join the New Jersey State Sanitary Association.

"The meetings are held annually, and papers concerning Sanitation in all its branches, Schools and School Architecture, Plumbing, etc., are read and discussed.

"The Association includes among its members Lawyers, Physicians, Civil and Sanitary Engineers, Veterinarians, Municipal Officers, Clergymen, Architects, Health Officers, and, in fact, representative men generally.

"The membership fee is two dollars per year, payable in advance, which entitles each member to a copy of our transactions in pamphlet form.

"Upon filling out the enclosed card, and returning same, together with your check for $2, to the Secretary, Dr. J. A. Exton, Arlington, N. J., or any member of the Committee, a program of our next annual meeting, to be held at Lakewood, N. J., November 16-17, will be sent to you, and your name will be presented for membership.

"Very truly yours,

"COMMITTEE ON MEMBERSHIP."

Nine hundred and twenty-four of these invitations, together with a blank application card (as per sample attached herewith) and an envelope bearing the name and address of the Secretary of the Association, have been mailed to persons in New Jersey interested in sanitary work.

A letter was also mailed to fifty members of the Association, asking each of them as a member of the Association to secure at least ONE new member. (Two application cards were sent with each letter.)

An invitation was extended to every person present at the conference of the State and local Boards of Health, at Trenton, in October, and application cards supplied.

A registration book has been supplied by the Secretary, and every member of the Association, as well as every visitor, is requested to register therein before the close of this session.

Respectfully submitted,

EDWARD GUION,
GEO. E. MCLAUGHLIN,
Committee.

THE PRESIDENT—You have heard the report of the Committee on Membership and Registration, what is your pleasure?

Motion was made and carried that this report be adopted.

THE PRESIDENT—The next will be the report of the Committee on "The Transmission of Disease by Flies, its Control and Prevention," by Gordon K. Dickinson, M.D., chairman of the committee.

(For Dr. Dickinson's report see subsequent pages.)

THE PRESIDENT—You have heard this report gentlemen, what is your pleasure?

By motion it was orderd that this report be adopted.

THE PRESIDENT—We will now receive the report of the Committee on "Organization of Anti-Tuberculosis Societies in New Jersey," from Thomas W. Harvey, M.D., who is chairman of this committee.

DR. D. C. ENGLISH—Dr. Harvey wished me to express his very deep regret that he could not be present with us this afternoon, but he sent his report to me, requesting that I should present it. It is as follows:

REPORT OF COMMITTEE ON ANTI-TUBERCULOSIS ORGANIZATIONS.

At the last meeting of the Sanitary Association, on invitation of the Executive Committee, Dr. Farrand, of the National Anti-Tuberculosis Society, delivered an address on the need of more efficient organization for anti-tuberculosis work in New Jersey. Your committee was appointed to assist in organizing associations for such work as suggested by Dr. Farrand. An early opportunity was afforded the committee. The Board of Trade of Newark, through the agency and assistance of Dr. Farrand, devoted two weeks of last winter to the study of the prevention of tuberculosis, presenting at the library the Tuberculosis Exhibit which had been arranged by the New York Society. Numerous meetings were held at that time, and lectures of a popular character were given and well attended. At the same time a meeting was called of those who were likely to be interested, and a State Anti-Tuberculosis Society was organized with the following officers and program:

NEW JERSEY ASSOCIATION FOR THE PREVENTION AND RELIEF OF TUBERCULOSIS.

President—Bleecker Van Wagenen, South Orange.

Honorary Vice-Presidents—Rt. Rev. Bishop James A. McFaul, Trenton; President Woodrow Wilson, Princeton.

Secretary and Treasurer—Robert L. Stevens, Hoboken.

Executive Secretary—William C. Smallwood, Newark, N. J.

Directors—Mrs. Caroline B. Alexander, Hoboken; Mrs. C. Ledyard Blair, Peapack; Charles F. Currie, Blackwood; Dr. William J. Chandler, South Orange; Mrs. Arthur Claflin, Lakewood; Dr. Theodore W. Corwin, Newark; Dr. Fred M. Corwin, Bayonne; Dr. Henry H. Davis, Camden; Dr. Laban Dennis, Newark; Dr. G. K. Dickinson, Jersey City; Dr. D. C. English, New Brunswick; Cornelius Ford, Hoboken; Rabbi Solomon Foster, Newark; Hugh F. Fox, Plainfield; Dr. Irwin H. Hance, Lakewood; Dr. Thomas W. Harvey, Orange; Dr. B. D. Hedges, Plainfield; Dr. Alfred M. Heston, Atlantic City; Miss Sylvia Delano Hitch, South Orange; Frederick L. Hoffman, East Orange; Dr. Edward J. Ill, Newark; Henry S. Kearny, Lakewood; James Kerney, Trenton; Philip LaTourette, North Branch; Bishop Edwin S. Lines, Newark; Prof. E. H. Loomis, Princeton; Dr. David Magie, Princeton; Dr. Philip Marvel, Atlantic City; Dr. John C. McCoy, Paterson; Arthur W. McDougall, Newark; Dr. George E. McLaughlin, Jersey City; Dr. Thomas N. McLean, Elizabeth; Thomas J. Mead, Newark; Dr. Alexander Marcy, Riverton; Dr. William H. Murray, Plainfield; Rev. Louis S. Osborne, Newark; Dr. G. B. Philhower, Nutley; Miss Margaret H. Pierson, Orange; C. S. Robinson, Princeton; Dr. Frank N. Robinson, Camden; Charles Scribner, Morristown; Dr. William G. Schauffler, Lakewood; Dr. Theodore Senseman, Atlantic City; Norman Ward, Orange; Mrs. Caroline L. Welling, Trenton; Miss Emily E. Williamson, Elizabeth; Edmund Wilson, Red Bank; Rev. Alfred W. Wishart, Trenton.

This is its program:

(*a.*) To organize local committees in cities and towns throughout the State; (*b.*) Through these committees, and directly, to deliver lectures in churches, clubs, private parlors, and before organizations and institutions; (*c.*) To distribute circulars of instruction in schools, department stores, shops, factories, and in homes where consumption is found; (*d.*) To procure the establishment of dispensaries which shall give direct physical and bacteriological examinations, and adequate advice; (*e.*) To provide registration, instruction, and nursing, as far as possible, for all indigent consumptives reported; (*f.*) To secure special diet for all consumptives not able to afford the same; (*g.*) To secure, through local Boards of Health, registration of all consumptives; (*h.*) To promote the establishment of sanatoria where consumptives may be received at moderate charges; (*i.*) To procure disinfection of all rooms in which consumptives have died; (*j.*) To prepare an educational Tuberculosis Exhibit, illustrating methods of open air and indoor treatment in the prevention and cure of consumption.

Your committee has taken an active part in this movement and is represented on the Board of Directors. The State Association has already organized local societies in Trenton, Camden, Elizabeth and Paterson, which, with the one previously formed in Orange, makes five. Other societies are in process of organization. Your committee feel that so far as organization is concerned, its work has been completed

The Executive Council also referred to this committee for report at this meeting the subject of "Sanatoria for Tuberculosis, their usefulness and their limitations." Dr. Hance has kindly agreed to supplement this report with a paper on this subject, which he will now read.

Respectfully submitted,

D. C. English,
I. H. Hance,
Thos. W. Harvey,
Committee.

Dr. English—I will take the liberty of making a few remarks in reference to the work of that Society. A recent meeting of the Society was held in Newark, and at that time the secretary presented a very encouraging report, showing the decided progress that had been made in the short time since the Society was organized. The communities seem to be eager for knowledge on this subject, and wherever meetings have been held much interest has been shown. I believe at the present time there are more calls for this work of education throughout the State than we have speakers to supply the demand. I might say the Oranges have already taken steps for the erection of a sanatorium on the second Orange mountain. This sanatorium is to cost about four thousand dollars. They are quite confident that the money will be subscribed, and that they will have one of these sanatoria arranged for and conducted by members of the Orange Society and other citizens of Essex county who are deeply interested in the work, and that there is no doubt this will be a very successful undertaking. Mr. William C. Smallwood, Executive Secretary of the Anti-Tuberculosis Society, has been exceedingly busy planning for and conducting public meetings in different parts of our State. He expected to be with us at this meeting, and I will ask if he is present if he will please rise, as I know the gentlemen would like to become acquainted with him. To this request Mr. Smallwood, who was present, responded by rising.

The President—We will now listen to the paper, referred to in the report, prepared by Irwin H. Hance, M.D., of Lakewood.

(For paper by Dr. Hance, see subsequent pages.)

Dr. Hance stated that it was Dr. Harvey's wish that Mr. Smallwood should have opportunity to speak a few words on the work of the State Anti-Tuberculosis Society.

On motion, it was ordered that the report of the Committee on Organization of Anti-Tuberculosis Societies in New Jersey should be received.

THE PRESIDENT—We would be very glad to hear from Mr. Smallwood, and we have a few minutes of time left which we can devote to this subject, if Mr. Smallwood desires to speak to us.

MR. SMALLWOOD—I am glad to say that the State Tuberculosis Association has been making very rapid progress. As Dr. English has informed you, several meetings have been held throughout the State, and we now have committees in Trenton, Camden, Elizabeth and Paterson, and will soon hold meetings in Newark, Bridgeton and Atlantic City. I spent last week in South Jersey for the purpose of learning to what extent tuberculosis existed there, as well as to study the best means for preventing it. The local boards of health of Bridgeton and Millville are doing nothing in regard to the prevention of tuberculosis. I found one family where a man had tuberculosis, and there were four small children in the same room with him. There were three beds in the room. The youngest child was a baby in the cradle, and the oldest about seven years of age. The head men of mills in the cities above-mentioned have agreed to co-operate with us in trying to educate their employees in regard to this subject. Our State Tuberculosis Committee expect to hold a meeting in Camden about the first of December. The work has been going on in a quiet way, and we have tried to avoid sensations. We are trying to secure the erection of sanatoriums. They expect to have the sanatorium at Glen Gardner ready for occupancy about the first of June, but there is no provision made for advanced cases. Paterson has an appropriation of $5,000 for a sanatorium, and they have asked for $7,000 more, and we feel that in the spring there will be a sanatorium there. It is my hope that every community, and especially such cities as Newark, Paterson and Camden, will have its own sanatorium.

THE PRESIDENT—The next will be the report of the Committee on the "Education and Training of Health Officers," by the chairman, John L. Leal, M.D.

DR. LEAL—This committee will report progress this year.

THE PRESIDENT—The next and last committee to report is the one on "Medical Inspection of Schools," of which Joseph Tomlinson, M.D., is chairman. I have received a telegram from Dr. Tomlinson, saying he cannot be present, and as the other members of the committee are absent, we are compelled to postpone the consideration of that subject. The next subject for discussion is "Smoke, Noise and Stench Nuisances." The first paper will be presented by Dr. B. D. Evans, of Morris Plains, on the subject "How and Why These Things are Bad for the Public." Dr. Evans made a very interesting and instructive address.

THE PRESIDENT—The next paper on this subject is entitled "What Has Been Done in New York City and How," by Commissioner Thomas Darlington, M.D., of New York city.

DR. SCHAUFFLER—I have pleasure in introducing Dr. Baker, who will read Dr. Darlington's paper, as he is unable to be present.

(For paper of Dr. Darlington see subsequent pages.)

THE PRESIDENT—The third paper on this subject is entitled "The Method to be Pursued in the Abatement of these Nuisances," by Mr. S. A. Patterson, of Asbury Park.

(Concerning paper by Mr. Patterson see page 57.)

THE PRESIDENT—The discussion of these papers will be opened by Dr. Henry Mitchell.

DR. MITCHELL—The point mentioned which is of interest to health officers is the question, Does smoke cause disease? Will smoke produce sickness? Will offensive odors or noises cause sickness? If they can and do cause sickness, there is no doubt about the authority of the law to abate them. I think we are very much indebted to Mr. Patterson for having brought these matters to our attention in this manner. Mr. Patterson has had experience and has had to face the court in dealing with these questions. When the day comes that we can show that noises will cause sickness it will be time to attack these nuisances as a board of health. We have troubles enough to enforce the law against matters which are very clearly within our limit, and to go outside of the plain duty which the law places upon us seems to me very unwise. If we will suppress the causes of typhoid fever, scarlet fever and diphtheria, we will serve our State well. The mistake of many boards of health in our State

is that they are perfectly willing to take up all kinds of complaints as a matter of helpfulness. They are too willing to try to prevent trolley cars from making noises, and lots of other things which we are not authorized under the law to take up at all. It seems to me the paper of Mr. Patterson has presented this matter in the proper light, and I hope the printed copy of his paper will serve as a guide and will prevent many local boards of health from undertaking things which they should not do.

THE PRESIDENT—Any further discussion? If not, we will proceed to the next paper, which is "Foreign Municipal Ownership of Abattoirs and the Necessity of Proper Meat Inspection," by W. M. Gill, V. S., of New York City. Dr. Gill has telegraphed that he cannot be present, and we will, therefore, now hear the paper on "Suggestions for Obtaining a More Complete Return of Births," by Mr. David S. South, State Registrar of Vital Statistics.

(For paper by Mr. South see subsequent pages.)

THE PRESIDENT—We have a letter from Governor Stokes, which the secretary will read:

[The secretary read the letter, in which Governor Stokes returned thanks for the invitation to attend this annual meeting, and regretted that important business made it impossible for him to do so, and expressed his deep interest in the good work the Association is doing.]

THE PRESIDENT—I will call to the members attention the fact that a book for registering has been provided, and ask that all will kindly be sure and register their names. Also, that we have present with us our treasurer, who will receive their dues. There will be a meeting of the Executive Council immediately after this session adjourns.

DR. N. L. WILSON—I would like to present the following resolution:

"*Resolved,* That the New Jersey Sanitary Association endorses Dr. Allport's plan of inspection of the eyes and ears of school children by school teachers, and that the legislative committee of this society be instructed to do its utmost to secure the passage of an act by our Legislature similar to that passed by Vermont."

In order that you may know what the Vermont law is, I will read it to you. It reads as follows:

"Section 1. The State Board of Health and the Superintendent of ducation shall prepare, or cause to be prepared, suitable test cards, lanks, record books and other needful appliances to be used in testing he sight and hearing of pupils in public schools, and necessary instruction for their use; and the Superintendent of Education shall furnish the same free of expense to every school in the State. The superintendent, principal or teacher in every school during the month of September in each year shall test the sight and hearing of all pupils under his charge, keep a record of such examinations according to the instructions furnished, and shall notify, in writing, the parent or guardian of every pupil who shall be found to have any defect of vision or hearing, or disease of the eyes or ears, with a brief statement of such defect or disease, and shall make a written report of all such examinations to the Superintendent of Education as he may require.

"Section 2. The State Auditor is hereby directed to draw his order on the State Treasurer for such sums and at such times as the Superintendent of Education, with the approval of the State Board of Health, may require to carry out the provisions of this act. The total expense under this act shall not exceed six hundred dollars ($600.00) in any bi-annual term ending June 30.

"Section 3. This act shall take effect July 1, 1905."

It seems to me that this is an important matter, and I have introduced it here hoping to get the sanction of the Association to this resolution. The same resolution passed the New Jersey State Medical Society last June. I think very many school children are suffering from defects of eyes and ears, and if these defects can be corrected, their lives will become more useful.

A motion was made and carried that this resolution be adopted.

THE PRESIDENT—Anything else?

MR. SOUTH—I will introduce the following resolution:

"*Resolved,* That the New Jersey Sanitary Association, individually and as a body, will favor legislation requiring a more prompt registration of births, marriages and deaths."

MR. ALONZO BROWER—It seems to me it would be a good thing if the law required the physician to furnish the information instead of the undertaker.

MR. SOUTH—The law is very complete on that subject. According to the provisions of chapter 39 of the laws of 1888 the physician must make a certificate of death and deliver it to the undertaker.

The resolution introduced by Mr. South was adopted.

THE PRESIDENT—We will now adojurn until eight o'clock.

EVENING SESSION.

The evening session was called to order by the President at 9:15, and prayer was offered by Rev. C. P. Butler, of Lakewood.

THE PRESIDENT—We have on our program two papers which are nearly akin to each other. One is the "Present Status of Sewage Disposal in the United States and Great Britain," and the other is the "Progress of Sewage Disposal in New Jersey." It was my intention to have each of these papers in the evening, but the Committee on Program saw fit to change this. As there are some engineers here to-night who will have to leave to-morrow, I have decided to defer the President's address until to-morrow, and make room for the paper on "The Progress of Sewage Disposal in New Jersey," by Mr. Boyd McLean, Secretary of the State Sewerage Commission, and he will now present it.

(For paper by Mr. McLean see subsequent pages.)

THE PRESIDENT—The discussion on this subejct will be opened by Clyde Potts, C.E.

MR. POTTS—The Secretary of the State Sewerage Commission has left very little to say on this subject, for he has covered the subejct fully. I might say the subject is very well chosen. During the last ten years the study of sewage disposal has advanced very greatly. A little more than ten years ago the people of Jersey City and Newark took their drinking water from the Passaic river above Belleville, and all of the towns above emptied their sewage into the river. When Newark and Jersey City went further up for their supply it was a big step in advance. Water supplies and sewage disposal must be treated together. For generations the people of this country have believed that they could take their drinking water from the nearest water course, and could also empty their sewage into the nearest water course, and the effect of that belief has been thousands of deaths from typhoid fever and intestinal diseases of all kinds.

Nearly all of the inland towns of this State empty their sewage into rivers which must be used for water supplies, and in those cases only the highest possible degree of sewage purification should be allowed. The present knowledge of sewage disposal has resulted in the idea that the highest degree can be secured by filtering the sewage over sand beds, either natural or artificial. One of the most common ways of first treating the sewage is to run the sewage into a tank where it is retained for about eight hours. In this tank a great deal of the sewage is broken up into solution. After leaving this tank one of the methods of disposing of the sewage is to run it on sprinkling filters which are made of coke or slag. After leaving these and being passed over a section of sand filters it can be made in very good shape, providing the people are willing to stand the expense. In those towns on the coast the main problem is the pollution of the oyster beds. Some of the worst outbreaks of typhoid fever have come from contaminated oysters. The typhoid bacilli are taken up by the oysters, and in this way the disease is spread. I want to say, in conclusion, that our President was honored by the Governor to an appointment on the State Sewerage Commission, which is doing a noble work in this line.

The President—Any further discussion on this paper?

Mr. Morris R. Sherrerd—I am glad to have heard the paper that has just been read, as in some measure stating the position of the State Sewerage Commission, at least as it affects the problem of the purification of the Passaic river. I would also say that I do not intend to speak either for the Passaic Valley Sewage Commission or for the State Sewerage Commission in this matter, but from the statements which have been made in the paper I think that I may be allowed to state some different points of view from which the question might be looked at as a resident of that district, particularly affected by the question of the purification of the Passaic river. It is not alone a question of the removal of sewage from the Passaic river that is involved in that problem. In fact, if it were only the removal of sewage I think that would properly come under the State Commission, but there are other pollutions beside the sewage. Factory wastes in that district are an element in the question which is a very large factor in the difficulty of arriving at a satisfactory solution of the problem. They are, perhaps, not

the pollutions that make the water unsuitable for potable purposes entirely, but they certainly make the water of the river of a very objectionable character. It may be possible, and I think it has been considered necessary, that such a condition of affairs has need of some other legislation than that which is now afforded by the powers of the State Sewerage Commission, and one reason for that is the fact that it must be some uniform action in order to get beneficial results. It must be done by the entire community, and that in the first place necessitates the grouping of the taxing districts and localities affected, and in a measure that is the justification for a separate commission. I grant that it is quite proper that that commission should act in conjunction with the State Sewerage Commission. I don't want anything I may say to detract from the work of the State Commission, but it is like every class of government, it ought to be done by local representation, and it certainly seems to me that the degree of treatment, or at least the expense and the apportionment of the cost is a question that ought to be determined by local representation, and that is in a measure the justification for a separate commission on this particular problem. Within the last few weeks the cities of Paterson and Newark have been endeavoring to get together on this important question, and I am very glad to say that from the results of the series of conversations, the last of which was held last evening in Paterson, it looks as if results that will be approved by the majority of the citizens of the entire district are now about to be formulated into some act, and I am rather doubtful whether such results, when the opposition of a large proportion of the people of that community to any drastic measures is considered, could have been brought about except by some co-operation of the communities interested.

THE PRESIDENT—Any further discussion? Would Mr. McLean like to say a few words in closing?

MR. MCLEAN—I mentioned in my paper the fact, which Mr. Sherrerd seems to have overlooked, that there were two complete schemes, either of which were available on the part of the municipalities, or they were perfectly free to act independently, if they so chose. One of those was for a district commission. That was proposed by the State Sewerage Commission in 1899, and the scheme was enacted into a law, which the districts could have taken advantage

of. Instead of that, a law embodying practically the same features was enacted by the Legislature in place of one coming through the State Sewerage Commission. The other complete scheme was that used by Orange—an outlet sewer discharging into the Rahway, at Elizabeth. The legislation creating the district commission was not needed because these two schemes were there, either of which would have satisfied all the demands of the district. I believe thorouhgly in home rule. I believe thoroughly in a municipality deciding how to spend its money and what advice it shall take, and for that reason I am opposed to any legislation which compels any particular locality to take some particular action. I am also opposed to two commissions, the one local and having power superior to the State Commission.

The President—We will now have the pleasure of listening to a paper on "The Present Status of Sewage Disposal in the United States and Great Britain," by Henry Hewitt, of Paterson, N. J.

(For paper by Mr. Hewitt see subsequent pages.)

The President—Mr. E. W. Harrison, of Jersey City, has kindly consented to open the discussion on this paper in the absence of Mr. Rudolph Hering.

Mr. Harrison—I have had some little experience in looking over sewage-disposal works. I don't want to be called the rider of a "hobby," but I have always noticed the enormous value of the personal element. I have had occasion to look over septic tanks and contact beds, but the difference between the methods abroad and the methods here seem to me, more than anything else, a personal question. The man who has charge of a filter plant or disposal works in Great Britain or France has enough to do without running the government of the town. He is not supposed to have anything to do with the election of the mayor, or appointments to the office of police. His business is to see that that plant is taken care of. Anybody who travels in Great Britain can see by the streams which he crosses the effect of this system of disposal. Litttle streams carry the sewage of large cities and no offensive substance is seen. Last summer I went to see the London outfall, because I was interested in the Passaic river disposal. This plant takes care of the sewage of over three million people, and there is one hundred and sixty-five million gallons of sew-

age a day to look out for. The works are in a rather difficult situation to reach, some twelve miles down the river Thames, and after reaching the end of the railway they told me to follow a path. I went there a hot morning and made up my mind I could not miss the plant, as I thought I could smell such a large amount of sewage, but I was surprised when I got there to find that I could not smell anything. One hundred and sixty-five million gallons of sewage passes through a system of longitudinal tanks. It runs so slowly that the sludge settles, and the only point where you can smell anything is where the sludge is taken off. The sludge is drawn out from the bottom of these long tanks or sewers, and has the thickness of about eighty-five per cent. water, and is taken about thirty-five miles down the Thames and dropped into a hole sixty to seventy feet deep. There was no indication at all, within a radius of two or three thousand feet, that this sludge from this large amount of sewage was put there. The London Common Council having read a great deal about our American works, had two or three men interested to try a septic tank system. They purchased several hundred acres of land, and they are making experiments. They spent a great amount of money and have taken up a large amount of land, and are able to take care of the sewage of ten thousand people, but they have come to the conclusion that it would pay the city better to carry sewers ten or twelve miles down the stream. Strained sewage is carried right into the Thames. I was there at low tide and that stream of sewage was running right into the river. Nearby were anchored ten or twelve vessels, and they would probably have avoided the place if there was any nuisance there. At that point the Thames was about as wide as the Passaic river at its mouth, but, of course, much deeper.

The President—Any further discussion on this subject? Our next paper is on a subject which excited a great deal of interest at the meeting last year, and we will now have the pleasure of listening to a paper on this subject of "Secret Nostrums and Proprietary Medicines." I notice the name of the person who is to present this paper is not printed on the program. I think the committee had a very good reason for doing this, for the person who is to read the paper made such a good impression here a few years ago that if it had been known that he was to be here to-night the

hotel would not have held the people. Dr. S. A. Knopf, of New York city, will now present the paper on this subject. (For paper of Dr. Knopf see subsequent pages.)

THE PRESIDENT—This paper is open for discussion.

DR. SCHAUFFLER—It is hardly necessary to start a discussion on such a paper, I think. Dr. Knopf has stated most distinctly what the dangers are in regard to patent medicines, and we have already had discussions on this subject here, but there is something that we can do, and it would be my suggestion that our legislative committee be asked to co-operate, during the coming months, with the legislative committee of the State Medical Society to have legislation passed at the coming session of the Legislature which shall restrict the sale of patent medicines in this State. This effort will be made by the State Medical Society, and I would suggest that our legislative committee be authorized to use their efforts in conjunction with the State Medical Society.

DR. N. L. WILSON—I think we all appreciate what Dr. Knopf has said. I want to say just one word as to what our Legislative Committee might do. At the last meeting of the Legislature the pharmacists of the State were able to defeat the patent medicine bill, and I have learned that the pharmacists are now getting together, and if they can get together with the Legislative Committee of the State Medical Society, and the Legislative Committee of this Association, I think possibly some bill can be drawn which will be effective, and I would suggest that our Legislative Committee take this matter up.

DR. H. H. DAVIS—If the Legislative Committee of this Association will drop a line to the secretary of the State Pharmaceutical Society, Mr. Jordan, I think he will be glad to co-operate with them. I had a conversation with him in Trenton a few weeks ago, when it was agreed that he would notify the members of the Legislative Committee of the State Medical Society when his committee would meet them, and I am sure he would also do the same with the Legislative Committee of this Association. We propose also to have the New Jersey State Board of Medical Examiners present at that meeting, and if all combine and act together, I think a suitable bill may be drawn.

On motion the Legislative Committee was requested to co-operate with the Committee on Legislation of the State Medical Society.

Dr. Hance—I received some information within the last few weeks which pertains to this subject. It was rather a surprise to me, and it is this. The patent medicine men have made use of the druggist in regard to advertising, but to my astonishment I learned of one case where a druggist was given the exclusive right in a certain territory, and for this privilege he was compelled to take stock in the company in order that it would be to his interest to push the sale of the medicines.

The President—If there is no further discussion, we will proceed to miscellaneous business, and will now have the report of the Treasurer.

(For report of the Treasurer see subsequent pages.)

Motion was made and carried that when the report of the Treasurer was properly audited it be accepted. The President appointed James Owen, C. E., and Prof. John B. Smith as the Auditing Committee.

The President—If there are any members here who have failed to register, they will please do so now. We will hold a meeting of the Executive Council immediately after this meeting adjourns.

Motion to adjourn was then made and carried.

THIRD SESSION.

The President—This session was called for nine o'clock this morning. I came in the room at that time and there were so few present that it was adjourned until ten o'clock. The next paper is number ten. I gave up my place last evening, and, therefore, the first thing this morning will be the President's address. In looking over the papers and subjects which have been presented in the past I found very little on a special subject to talk about, and, therefore, I would present some sanitary matters of interest to this Association.

(For President's address see subsequent pages.)

THE PRESIDENT—The next paper is on the subject of "Flood Control and Conservation of Water, Applied to Passaic River," by Morris R. Sherrerd, C. E. (For paper of Mr. Sherrerd see subsequent pages.)

VICE-PRESIDENT JOHN B. DUNCKLEE, C. E.—The discussion on this paper will be opened by James Owen, C. E.

Mr. OWEN—I am somewhat at a disadvantage in discussing this paper because I had no knowledge of what the paper of Mr. Sherrerd was going to contain. I think any criticism on the paper itself would be rather presumptive on my part, and I shall refrain from saying much except to call attention to one or two points. The first thought that occurs to me is this, that the flooding of rivers is not unusual in other rivers beside the Passaic. The difficulty of the flooding of the Passaic is that instead of being a usual process, occurring periodically, it is spasmodical, and occurs only once in a while in a number of years. The question arises whether the damage would be more than compensated by the money spent in preventing it. The question is whether the flooding might not be considered a feature of the locality. In Cincinnati the river rises periodically thirty to forty feet. It is an accepted fact there that it must be expected, and provision is made for that fact. The buildings are not calculated to be occupied except during the period of flood. I remember seeing a photograph of a Chinese city where the buildings on the river front were erected on piles about fifty feet high. The question would naturally arise why those people built those high piles. It was simply a provision for a flood. Another point not alluded to by Mr. Sherrerd is the fact that the Passaic river is being persistently narrowed in its channel. In 1872 the State of New Jersey authorized the provision which established dock lines on the Passaic river, and that narrowed the river from say five hundred feet to a width of about three hundred and fifty feet. The objections were not appreciated at the time, and were not appreciated until these floods occurred. I think in the line of flood prevention the question of the enlargement of the channel is a material one, and it seems to me there should be some provision for the enlargement of the channel of the river in some way. Of course, there is also the possibility of deepening the channel, which is a function of the National Government, and I have no doubt that part of it can be handled with much

future benefit to the people. There is another point I have often thought of, and that is the wiping out gradually of the water interests of New Jersey. The State of Massachusetts has consistently conserved the water-power of the State. In New Jersey the water-power has been eliminated, especially in the northern part. That was due chiefly to the diminished water-supply of the country, owing to the wiping out of wooded lands, etc. I think it is the business of the people of New Jersey to conserve their water-power first. The policy of the law of the State of New Jersey in not providing for a continuation of that power is not right. We are acting under the old common law. In England it has been amended during the last few years, and there no water-power is allowed to be abandoned, and the law provides that as much water-power shall be supplied to mills as was naturally the case. The great cry to-day is that the reason of the excessive pollution of the river is because of the loss of flow of water in the river. There should be proper and adequate provision made to give the Passaic river its normal and proper flow, not what it is to-day, but what it was when nature first had its free scope on the river.

E. W. Harrison, C. E.—I am very much interested in these papers, and have had opportunity to look into this matter myself. I agree with Mr. Sherrerd that the Mountain View site is far ahead of the lower Passaic river reservoir, but I think the question needs considerable more study and thought. I do not think the subject is a feasible one from an economical point. I find the commission estimated the damage by floods at fifteen millions. I must say I think it very liberal. If it is a good thing to spend six million dollars now to prevent the floods it was a good thing in 1865. A very singular thing about the flood of 1893 is that the highest point of the flood came down the river and met, just below Newark, the highest tide known for many years. How often in how many years do you suppose that would happen again? Another point is the uncertainty of this flood proposition. If that flood of 1893 had occurred at a time when snow was also being melted there would have been a flood, notwithstanding these proposed improvements. I have looked over the report of the damage. The commission noted several millions in losses of real estate, but the assessment books of the towns affected did not show that loss in taxes the next year. I acknowledge there was a great

deal of damage done, but it was not done to the real estate. I think the estimates for the purchase of the needed lands are too low. We may come to the question of using this water, and I think it a very fine idea, but it has not come to that yet. They can increase their water supply at present by increasing their water area. You can practically double the water supply of the two largest cities of the State at present. I think we will reach a time when the Mountain View reservoir will need to be built, but I don't think it necessary now. In Europe they put up lines showing the point to which the rivers will rise. The people owning the mills on the Passaic have known for over thirty years that when the river gets high the water will come into the mills.

THE PRESIDENT—Any further discussion? Would Mr. Sherrerd like to say anything in conclusion?

Mr. SHERRERD—I would like to say, in regard to the figures used by the last speaker, that he seems to have confused them. The six million dollars is for both the flood control and the conservation of the water, and not for either proposition alone. I believe that the scheme for the flood control alone is rather expensive, but I think that all persons who have given the subject of water conservation in New Jersey some thought know that it is, perhaps, the province of the State to do something in this matter, for the reason that communities which are not now in need of the water will find it much more difficult to get the water when they do need it if private water companies are allowed to get in in advance and gobble up all the available supply.

THE PRESIDENT—Before announcing the next paper I would like to call the members attention to the fact that they must all register while they are here. If not perhaps when they call on the cashier they will find that their rates will be considerably higher. Our children pass about one-third of their time in schools, and it is a vital necessity that our schools should be properly constructed. The executive council had this matter under consideration, and decided to have a paper on "School Architecture from a Sanitary Standpoint," which will be read by Mr. Nathan Myers, of Newark, N. J.

(For paper by Mr. Meyers see subsequent pages.)

THE PRESIDENT—The discussion on this paper will be opened by Mr. Francis Bent, architect to the State Commissioner of Charities and Corrections.

(For Mr. Bent's remarks see subsequent pages.)

Dr. Knopf—The subject of school sanitation and ventilation has interested me for years, because I feel that bad ventilation, overwork in schools, and bad sanitation in general is often a predisposing cause of tuberculosis in children. I would like to ask the reader of the paper whether he does not think it important to round off the walls and floors to facilitate cleaning, and whether he does not also favor removable furniture? A proper amount of moisture and air in schools seems to me important. What I think has been neglected in the construction of our schools is open air rooms. I believe that during mild weather singing and recitations could be most advantageously carried on in the open air. We have not enough roof gardens. I firmly believe that if we would make it compulsory for each class to have one hour each day out of doors we would have less respiratory disease. A subject on which I feel very deeply is that of baths and swimming tanks. I think no school has a right to exist without baths, and no school has a right to exist without a swimming tank. I have the honor of being the senior physician at the North Brother Island home for consumptives. Two years ago when the Slocum disaster happened my duty called me over there, and when I saw those hundreds of little ones laid out, I said to myself, whenever I have opportunity I will plead for swiming tanks in schools, for I think that if even half of those children had known how to swim the fearful disaster would have been diminished by half, and if all had been able to swim perhaps the loss would have been very small. Therefore, Mr. President and gentlemen, whatever you do when you build school houses don't forget the swimming tanks.

The President—Any further discussion?

Mr. Brower—I have been very much interested in the papers read here. There is one thing that seems to me should be compulsory, and that is to prevent rural districts from putting shutters or blinds on the schoolhouse windows. A large percentage of schoolhouses in rural districts have shutters to prevent the boys from breaking the windows, but it seems to me that should be prohibited so that light and sun could shine into the school buildings.

Mr. Bent—In regard to this matter of blinds. I wish there was a law giving power to the State Board of Educa-

tion or the school architect to prevent blinds being put on windows. One plan presented to us showed windows back of the platform, directly in front of the scholars faces, but they were covered with blinds which it was said would never be used as they would always be closed.

Dr. F. W. SELL—I think some one should make a motion that this Association should recommend to the Legislature that the State Board of Education be authorized to appoint inspectors. I therefore would like to make a motion that this Association respectfully suggest to the Legislature that the State Board of Education have the means of appointing inspectors, or facilities for appointing inspectors, whose duty it shall be to see that all plans are properly carried out, and that these inspectors shall have all the power that the board shall deem necessary.

Dr. D. E. ENGLISH—I would suggest that this board should be a board of architects, not merely sanitary architects, but architects in the broadest sense of the word. Mr. Bent speaks of putting blinds on windows behind the teachers desk. Notwithstanding what has been said, I take the side of the architect. If those windows were not put there the architecture would be marred. They could be put there and the blinds kept closed without damage. I think we neglect sometimes the point of beauty in the construction of schools, and I think beauty is a necessary thing.

Mr. BENT—I belive that if this Association should recommend a board of architects their action would not be viewed favorably, as it is the function of the local boards of education to appoint architects to do this work. In regard to taking out the blinds and windows referred to it was an improvement on the building.

Mr. MYERS—In regard to this resolution I would say it is treating the subject from a legislative standpoint. In regard to appointing inspectors I would agree to that. I dare say there are few school houses where the rooms comply with the law of eighteen square feet per pupil. I recently submitted plans for a school house, and they came back the same as I sent them, apparently unopened. I don't know when a school house is being built whether the Board of Education will put in more pupils than I planned for. The only way to see that the laws are complied with is to inspect the school once or twice a year. Many architects are doing

the work through political influence, and they do not properly study the situation.

Dr. SCHAUFFLER—In order to bring this matter properly before the Legislature I would like to amend the resolution, and move that the matter be referred to the Legislative Committee and that they take it up in a proper manner.

Mr. BENT—It is all right that the State Board of Education have the power to appoint one or more inspectors, but the law should be amended particularly setting forth the character of the sanitary work. It should be plainly stated in regard to the sanitary arrangements of the schoolhouses, and also some testing of the heating and ventilating apparatus.

Mr. OWEN—There are two or three complications to this matter. All school-houses are erected by local authorities. The State board only has the supervision. To inject the authority of the State into each little school district I am afraid will cause trouble. All plans must be approved by the State board, and if not approved the State board will withhold the money, but I am afraid this proposition to give the State board the power proposed would be impracticable. I would suggest that some way be found by which the State board might have some powers, but not this control proposed.

THE PRESIDENT—Gentlemen, this is out of order, as this motion has not been seconded.

The motion was then seconded.

Dr. DAVIS—I think if we could have certain requirements in the State law to make the schoolhouses perfectly sanitary it would be well. In many localities the reason why better school buildings are not erected is because when the local boards start first to build they want to have an elegant school building and a sanitary one combined, but they are held down by lack of money. If it was the law that they could not build school buildings which were not sanitary it would be known that they must have sufficient money before they could start.

The motion made by Dr. Sell was then voted upon and defeated.

Dr. SCHAUFFLER—I now move that the subject matter of the paper be referred to the Committee on Legislation,

with the request that they take the matter up and see what can be done.

Mr. OWEN—I would suggest that if you want to get this subject in shape that a special committee should be appointed to prepare a bill.

Dr. SCHAUFFLER—My motion covers that absolutely. Any suggestions should be referred to the legislative committee to put in such shape as seems best.

Mr. OWEN—It seems to me this is a special object requiring special action, and it should emanate from a particular committee.

Dr. WILSON—I would like to amend the motion by adding that the Chairman appoint a committee of three to act in conjunction with the Legislative Committee.

Dr. SCHAUFFLER—I accept that amendment.

The motion made by Dr. Schauffler, as amended, was carried.

THE PRESIDENT—Would Mr. Myers like to say a few words in closing?

Mr. MYERS—I am going to differ very strongly with my colleague, Mr. Bent, upon the subject of cement floors in toilet rooms. We all know that cement absorbs. If you put down a cement floor of the best quality in the boys' toilet room, and after it has been used a while break it up you will find it stained. I found, in going in a boys' toilet room where a cement floor was used, that there was always a stench, and still the janitors would insist that they cleaned the place up with hot water. In the girls' toilet of the same school there was no smell whatever, and the janitors told me it was in the floor and they could not get it out. In using albedene stone or slate, you do not get that odor, because there is no absorption. Regarding the amount of cracks in slate, I do not quite agree with that. If you put down a cement floor and the building afterward expands or contracts there will be cracks in the cement. I want to say if you crack up a stone floor you will find no discoloration, while with cement you will. We always advise and should insist upon having, not only the ceilings rounded, but also the floors and walls. There are a lot of systems of ventilation that don't work, yet there are some that do and these should be used. In case you have fresh air coming in near

the ceiling and you open your windows that air will go out and you do not get the result. While the system is running you must keep the doors and windows closed. Of course, while the heating and ventilating system is not running then the proper thing is to open the windows. Concerning roof gardens for recitations, it is not quite the thing for me to answer that remark, as it is more for the school superintendents to answer, but I do not believe that class recitations on the roof are feasible. Roof play grounds are good, but if you want the pupils to sit still on the roof I don't think it practicable, and don't believe we will ever have recitations on roofs. There is no necessity whatever for putting blinds on the outside of school buildings. It is not necessary to put blinds on windows to keep boys from breaking the windows. We should put up wire guards to prevent the breaking of windows, and let the sunlight get into the school rooms. The placing of windows back of platforms is not proper. Audiences should not face the light, and it is not proper for school children to face the light.

THE PRESIDENT—We will now proceed to miscellaneous business and the election of officers. The first will be the report of the Auditing Committee.

The Auditing Committee reported that they had examined the Treasurer's books and found them correct, when,

On motion, the Treasurer's report was adopted.

THE PRESIDENT—The next will be the report of the Executive Council. (For report of Executive Council see subsequent pages.)

MR. OWEN—I would move that the report of the Executive Council, so far as it relates to the election of new members, be adopted, and the Secretary cast the ballot for the election of these members.

This motion was carried, and the gentlemen proposed were declared to be elected.

MR. OWEN—I would also move that the report of the Executive Council, as it relates to the nomination of officers, be adopted by this meeting.

This motion was likewise carried.

(For list of officers, see subsequent pages.)

VICE-PRESIDENT—I move that the thanks of the Association be extended to the management of the Laurel-in-the-

Pines for the courtesies extended on the occasion of this meeting.

This motion was carried by a rising vote.

Col. OLCOTT—I offer the name of Nathan Myers as a member of this Association, and move that the Secretary cast the ballot electing Mr. Myers.

This motion was voted upon and carried.

THE PRESIDENT—The next meeting will be held at Atlantic City.

Motion for final adjournment was made and carried.

Treasurer's Report.

GEORGE P. OLCOTT,

Treasurer, in account with the New Jersey Sanitary Association.

RECEIPTS.

1905.				
Dec.	1.	To balance cash on hand,	$240.29	
1906.				
Dec.	1.	To dues received to date,	238.00	
				$478.29

DISBURSEMENTS.

1905.				
Dec.	9.	James A. Exton, Secretary, expenses,	$48.60	
		Charles J. Merrill, stenographer,	20.00	
		Laurel-in-the-Pines, expenses,	7.50	
		Sundry expenses, Treasurer,	4.80	
	30.	Printing receipts,	1.75	
1906.				
Jan.	11.	W. H. Spence, for printing,	8.15	
Mar.	15.	Postage,	6.26	
		Register book, Bayonne Pen Co.,	6.50	
	24.	Expenses, Publication Com.,	7.65	
		James A. Exton, Secretary, expenses,	11.24	
		MacCrellish & Quigley, printing report,	102.55	
				225.00
		Balance cash on hand,		$253.29

Respectfully submitted,

GEORGE P. OLCOTT,

Treasurer.

PRESIDENT'S ADDRESS.

H. M. HERBERT, C. E., BOUND BROOK. N. J.

We feel justly proud of the fact that we are Jerseymen, and also that we are members of this Association, for our State stands in the foremost ranks regarding our health laws and our sanitary condition, both of which have largely been brought about by the urgent suggestions and co-operation of members of the Association.

It is not my intention to speak further of their relation, for they have been laid before you by my predecessors in a much more capable manner than I am capable of doing, but the conditions are changing and new discoveries are being made daily which we must meet and be prepared to cope with or else content ourselves with being relegated to the realm of old fogyism.

It was but a short time ago that persons living in certain localities who were careful of their health would not venture out of doors after dark or early in the morning lest "the dampness should give them the malaria." Our court records show that about a quarter of a century ago there was an action brought against one of the large railroad companies to compel it to abandon an old mill pond which was being used as a watering station. Much expert testimony was given showing that the decaying vegetable matter, caused by the raising and lowering of the water-level in the pond, produced an epidemic of malaria. To-day we would look askance at the professional man who advanced this theory; some sanitarians going so far as to claim that "if we had no mosquitoes, we would have no malaria or yellow fever." Perhaps all of us are not willing to accept their theory without qualification, but even the most skeptical are forced to admit that there has been a very marked decrease in deaths due to malarial affections since 1897, as is shown in the last Report of the State Board of Health, and this, in a measure, coincides with the movement now on foot for the extermination of the mosquito. According to the United States Census Report for 1900, the death rate in the "registration area," due to malarial fever in 1900, was 8.8 per 100,000 population, while in 1890 it was 19.2 per 100,000.

For the corresponding years the death rate, from the same cause, in New Jersey was 5.8 and 19.0, thus showing that while in 1890 we were about the average, yet in 1900 we had fallen to three points below it. The States constituting the registration area are Connecticut, District of Columbia, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Rhode Island and Vermont, and most of these have, during the last fifteen years, been reclaiming and draining much of the low, wet lands, thus, unintentionally or otherwise, destroying the breeding places of the mosquito. The experiment of exterminating our "pet bird," which is being tried by this State, will be watched with a great deal of interest, but to be successful it must receive the hearty co-operation of all the inhabitants. If Circular No. 112, issued by our State Board of Health, could be placed in every household, it would materially assist Prof. Smith in his good work.

A matter which should receive the serious consideration of this Association is the pollution of the road beds of the railroads. Dr. John N. Hurty, in an able paper read before the Sixteenth Annual Meeting of the State and Local Boards of Health of Ohio, discusses this question at some length, and states that he believes the "old trunk lines of the United States are infected for practically their entire length" with the bacillus typhosus, and to avoid further dissemination of typhoid and diarrhœa infection advises the use of retention closets on all cars. As it is now a generally admitted fact that flies are instrumental in transmitting the typhoid germs, it becomes our duty to make a thorough investigation of the subject. The railway companies have done much during the last few years towards improving the sanitary condition of their cars and stations. But there is room for still greater improvement. The most important of these is ventilation. The passenger coach of to-day, with few exceptions, has the same means of ventilation that it had twenty, yes, forty years ago, viz., a hole in the roof or an open window, either of which means a cold or, possibly, pneumonia. The air in a car carrying its full quota of passengers should be changed once in every three to five minutes. This can be comfortably done, but to do so requires coal, and coal costs money, and the company would prefer to convert the money into "water." The closets in a large proportion of the cars are "antique," and the condition in which we usually find them is far from perfect. On the same line of

road we find some of the smoking-cars provided with cuspidors and some without. As a rule the street railway and trolley cars are simply filthy. I have mentioned our health laws and sanitary condition, two things that should go hand in hand, as one is dependent on the other. But do they? No matter how good the law is, if it is not properly enforced it is worse than useless. An example of this was recently brought to my notice while crossing the North river on one of the large ferry-boats. The colored deck hand was cleaning the cuspidors by the sanitary method of emptying the contents into a pail which originally contained about two quarts of water, and then dipping a brush into this solution he proceeded to carefully wipe out the tops of the other cuspidors, and mop up the floor with this accumulation of various disease germs, thus insuring an equal and just distribution of the danger. At the same time, several notices were posted about the cabin stating that "Spitting on the Floor of this Boat is a Misdemeanor. $1,500 fine or imprisonment for one year, or both, may be the punishment thereof," etc. Would it not be well for the State Board of Health to create a department whose exclusive duty would be to inspect all vehicles (including licensed cabs, hacks, etc.) used for public transportation and see that the health laws are properly enforced. The subway or underground railway has not yet made its advent in the State, and it is probable that the problem of ventilation will have been solved by the time the tubes under the North river are opened for traffic.

We need more stringent laws making a clearly medical inspection of school childen compulsory. Owing to the penuriousness of the municipalities, there are but few districts throughout the State where this is done, nor will any steps be taken towards doing so unless some pressure is brought to bear. The cost of medical services and undertaker fees for one epidemic of measles, diphtheria or scarlet fever will more than pay the annual salary of the medical inspector. A "fire drill" could be advantageously introduced into all the schools having over 100 pupils, and would prove of great value should occasion demand. This is another case of compulsion.

It should also be made the duty of the local Boards of Health to thoroughly inspect the school buildings once each month, or oftener, during the school year. This would seem like imposing upon the good nature of an already over-taxed and under-paid body of men (for most of the members of

our local boards receive no remuneration of any kind for their services). But be it said to their credit and honor that, with few exceptions, these men have been found ready and willing to, not only sacrifice their time and comfort, but risk their health and even lives for the welfare of their communities, and for these services they are too often rewarded by being ignominiously turned down to make room for more pliable and less capable servants. If our local Boards of Health could be entirely divorced from local politics better results, no doubt, would be obtained. This could be accomplished by having the local boards, or, at least, a majority of the members of each board, appointed for a term of not less than five years by the State Board of Health.

With the advent of the automobile came a new menace to the public health which has not yet been fully recognized. I do not refer to the nervous disorders caused by rapid running, interspersed with "thrills" obtained by knocking down an occasional telegraph pole, jumping over embankments, or once in a while running down a pedestrian; these are only secondary. The principal danger lies in the clouds of dust raised by the rapidly-revolving wheels and broad tires of the automobile. This dust not only envelops the less speedy travelers on the road, but it also penetrates the adjacent houses in large quantities. The surface of the highways must of necessity be more or less contaminated so long as horses, cattle and persons affected with various contagious diseases are allowed thereon. We are aware that this dust inflames the eyes and irritates sensitive throats, and I believe that still more serious troubles can be traced to the same cause. It is claimed that the dust collected in the soles of our shoes and the trailing skirts of women constitutes a grave menace to the health of our households. Also, in many of the larger towns sweeping of the sidewalks during the busy hours of the day is prohibited. Yet, how immeasureably greater does their danger become when the germ-laden dust is carried into our throats and lungs with every breath. If this theory is correct, then steps should be taken to lessen the danger. At the present there seems to be but two ways by which this may be accomplished—either by a further reduction in the speed of the motor vehicles, or else by the construction of dustless roads.

We should devote our best energies to furthering the organization of Anti-Tuberculosis Societies throughout the State, and the erection of sanatoria and camps for the treat-

ment of tuberculosis patients. Judging from the time required to build the State Sanatorium, this work cannot be commenced too soon, for many will pass over the "great divide" while the building is in course of erection. The "great white plague" still leads in the race of death, not only in this State, but throughout the United States.

With the rapidly increasing population of our State the question of a pure and wholesome water-supply is becoming a serious one. Nature has amply provided for this by giving us innumerable lakes and streams of the purest water so situated as to be accessible to all communities, which, if properly conserved and protected, not only against pollution, but also against absorption by corporations, will furnish us with the water necessary for all time to come. Governor Stokes, in his first annual message, suggests that the State should acquire control of the fresh-water lakes and preserve them for the use of the people of the State. This would be the most effectual way of preserving these natural reservoirs, and it is to be hoped that the commission to whom this matter was referred will report favorably upon it. The State is doing much toward reclaiming the rivers, many of which were fast becoming open sewers, but the Passaic still remains a "stench in our nostrils." The average citizen looks upon a stream as the natural receptacle for *his* untreated sewage, which is of the pure and harmless kind, while his neighbor just above, or the one on the opposite side (especially if the stream is the dividing line between two States) is guilty of grossly polluting the water. Now that New York, Pennsylvania and New Jersey are working harmoniously to attain that end, it is reasonable to expect that the Delaware river will soon be restored to something like its former purity.

Something should be done at once to protect the breathing beaches of several of our seaside resorts from sewage pollution. All the sewerage systems which are now being, or have recently been installed, were compelled to provide a purification plant which would allow only a comparatively clear effluent to be discharged into the ocean. But where some of the older systems are in operation it is not an unusual thing to see the high-water mark along the beach clearly defined by a deposit of well-preserved human excrement. An appeal to the pride of the local authorities has little or no effect, and under the present laws this seems to be the only course which can be pursued.

The pollution of the waters of our State is having a marked effect upon the shellfish industry, the income from which formerly amounted to about $3,000,000 per annum. Owing to the danger of transmission of typhoid fever through the agency of the clam and oyster, there has been a material falling off in the demand for them. A few years ago the Shrewsbury, Shark river and Princess bay oysters were considered choice articles of diet and were in great demand. But would you knowingly partake of them today?

I have endeavored to draw the attention of this Association to a few points of interest in sanitary matters, and feel that if we would unite and work together on these matters that much could be accomplished. It is a very hard matter for the State Board of Health, the State Sewerage Commission, or any other public body to accomplish much throughout the State without the co-operation of the people themselves, and if we can get the approval and hearty cooperation of organizations like the New Jersey Sanitary Association it is more than half the battle.

THE HOUSE FLY AND ITS CONNECTION WITH DISEASE DISSEMINATION.

By G. K. Dickinson, M.D., Jersey City, N. J.

The channels by which disease germs are carried is a matter much discussed by the profession and the laity. This question has been answered by superstition and plausible ignorance for ages. Agents, at one time believed noxious, have become practically ignored. It behooves the physician and the sanitarian to investigate carefully and scientifically such means of dissemination as seem potent. The mental attitude of the profession towards flies as an important agent in the spread of disease has been one of credulity and indifference. The object of this paper is to present this question in its several aspects, quoting only those authorities whose statements are the result of careful observation and experimental investigation.

Seven different varieties of flies are found in our houses, 98 per cent. of which is the common house fly *(Musca domestica)*. Born in manure, generally that of the horse, or in decomposing matter of any kind, vegetable as well as animal, they enter our homes to alight on foods there stored. Their tastes are indelicate and omnivorous; they subsist on sputum, fecal juices, and the slime and dirt that sticks to exposed surfaces.

House flies are without stings, and are unable to penetrate the skin. Their proboscides, through which they feed, are connected with an extremely active salivary gland, capable of pouring out a large quantity of saliva, which the fly projects against a dry surface, swallowing the subsequent solution. Naturally, solid particles, living organisms, parasites, and eggs, small enough, may pass into this digestive tube. Bacilli of different types and eggs of the nematodes have been observed in the proboscides, stomach, intestinal tract, and defecations. The time that particles remain in the digestive tract of the fly is from 12 hours to 23 days. Evidently the digestive secretions are not active for harm, as organisms will not only pass through alive, but increase in number while in transit. There must be some absorption of the toxins of bacilli, for flies die in large numbers which have had the fortune to imbibe such bacilli as those of the plague and anthrax. Flies are large breeders, lay their eggs by preference in horse manure, but also in decaying meat, meat broth, cut melons, dead animals, and even in cuspidors. On these substances their larvæ subsist until they hatch.

From 10 days to 2 weeks after the time the egg has been laid the fly is fully hatched. It is estimated that one fly, laying 120 eggs at a time, will have a progeny amounting up to the sextillions at the end of the season. Busck[15] took a quarter of a pound of horse manure and found in it 160 larvæ and 146 pupæ. This would make about 1,200 house flies to a pound of manure. In a cubic inch of manure taken two inches below the surface 200 pupæ were found.

Caldwell,[41] noting fly larvæ in countless numbers in refuse which had been buried 3 days, questioned as to what became of the flies when the pupæ were hatched deep in the ground, where, after careful search, but one dead fly was found. He made experiments to solve this problem, taking earth and night soil from the trenches, putting it in a glass box, the top of the box being covered with muslin carefully fastened down with gummed paper. The soil and earth were carefully arranged so as to form an imitation of a shallow trench. On the fourth day the first fly made its appearance, and by the morning of the seventh day the space between the muslin and the paper was swarming with them. He analyzed the events as follows: The ova are deposited in the latrines, and are conveyed in filth-carts to the trenches; the larval and pupal stages take place below the ground, and the developed fly makes its appearance between the covering of earth. He never succeeded in hatching flies in wet earth.

Most writers claim that flies do not travel far from the locality in which they are bred, and little is known as to just what distance they may cover. Professor Packard, according to Ernst,[13] gives the rate of speed of the common house fly as 5.35 meters per second, or a mile in 5 or 6 minutes, which is at the rate of 10 miles an hour. Packard thinks any of the flies can scent their food for several miles, and might fly 20 or 30 miles a day if aided by winds.

Our present accurate knowledge of the possible spread of diseases by flies is antedated, like many of our modern ideas, by the inferential observations of astute observers of past times. As early as 1498, in a work attributed to Bishop Knud,[24] is the statement that the plague may be foretold by frequent changes in the weather, much fog and rain, and the increased number of flies, and in 1577 Mercurialis noted that flies, after lighting upon the sick, visit other houses, depositing their contents upon bread and other articles of food.[26]

Sydenham[1] (1666) says: "From my own practice I know of only two observations by which we can prognosticate the healthiness of the autumn that is to follow; first, if fevers appear unnaturally early, the season that follows will be exceedingly favorable to the development of epidemics. I have remarked that, if swarms of insects, especially house flies, were abundant in the summer, the succeeding autumn was unhealthy. This I observed to be the case during the whole summer of the aforesaid year (1661), while in the summers of the two following years, which were very healthy, the insects were very few. Still, I must remark that at the approach of even so severe a disease as the plague, they were not observed to be very abundant. With

these two exceptions I have observed that all prognostics are fallacious." In 1853, "J. F."[24] referred to the increased number of flies in cholera times, and in 1873, Nicholas,[24] speaking of the cholera epidemic at Malta in 1849, states that he was then impressed by the possibility of flies transferring diseases, as they were present in great numbers, and had free access to dejections and food. Marpmann[24] (1864) said that the natives of Friesland blame the spread of hog erysipelas to flies, and Francis,[24] in 1893, reported the case of a woman he saw in 1846 who developed cholera shortly after swallowing a fly, and who died from the disease. Joseph[24] believed that domestic flies may carry bacilli and deposit them on wounds, and that anthrax may result from infected flies being crushed on a wounded surface.

The inferential deductions of the better-informed writers of recent date should be admitted to the argument. Davaine[24] (1868) stated that the infinitesimal quantity of blood which suffices to transmit anthrax corresponds with the amount of fluid in the fly's proboscis. He claimed (1870) that the rôle flies play in the transmission of anthrax had long been known. Moore[7] (1893) suspected flies as being carriers of cholera, typhoid fever, tuberculosis, anthrax, and leprosy. Battersby[8] (1895) attributed an epidemic of typhoid fever to flies which were abundant, the water supply being beyond suspicion. Bachman[10] (1898) suspected the ability of flies to carry the eggs of parasites and deposit them on food. Joly[24] (1898) argued that if flies can carry pollen, why not bacterial matter. Veeder[18] (1898), noting a commode from which typhoid excreta had been recently emptied without cleansing, and placed next to a pitcher of milk, saw flies gather around both, endangering, in his opinion, not only that household, but the whole neighborhood.

Hervioux,[23] observing that in the epidemic of smallpox in Tamorna-Djedida the disease spread in the direction of the prevailing winds, placed the responsibility on flies. Abbott[25] and Rosenau[26] make flies responsible for much of the spread of typhoid fever, for they breed in and feed upon infected discharges, and convey the infection to the food supply, particularly milk. They may alight on the lips and other portions of the body. Parke[27] notes the possibility of flies distributing anthrax, plague, cholera, typhoid fever, tuberculosis, trachoma, septicemia, erysipelas, recurrent fever, and leprosy, and adds that they may also transport the eggs of animal parasites and deposit them on food. Martin[33] observes that an increase in the number of flies is followed in about 1 week by a corresponding increase in diarrhœic diseases, and in 3 to 4 weeks by an increase in typhoid fever. Nash[34] noted the unusual absence of summer diarrhœa, and at the same time an absence of flies—the flies and enteric conditions appearing at the same time later in the summer. Cobb[44] saw a box of dates exposed within 100 feet of 5 tuberculous patients spitting, and watched flies going from the sputum to the exposed fruit. Braun[50] lays the distribution of the oxyuris to flies.

There seems to be no restriction to the diet list of the fly. Common observation will show that anything organic serves as food. In Egypt

they swarm around the sore eyes of the natives. In the hospitals they congregate around exposed wounds and dressings; in the field, on dead animals; in barns, on the sores and nares of sick animals, and wherever dejecta have been thrown or sputum expectorated there will flies alight and feast. The logical conclusion would be that whatever particles existed in these several localities small enough to be drawn into the stomach of the fly, passage of such would occur, and, if bacteria be present, make the host a receptacle and carrier of the same, to be disseminated later.

Any marked change in fly life impairs their vitality. In the open they undoubtedly live for a season; confined in bell-jars or cages at ordinary temperatures, a goodly number die within a week.[24 30 52] The health and longevity of flies also seem to be materially affected by the bacteria which they may ingest. It has been noted that in plague laboratories dead flies are numerous, giving the suggestion that they might have succumbed to the effect of contained plague bacilli.[27] This has been proven by Davaine,[24] who fed 4 flies on anthrax blood, 3 of which died. Nuttal[24] experimented with *Musca domestica* fed on animals dead from the plague at 14° C. All were alive at the end of 8 days. Another experiment found them all dead on the seventh day, whereas of the controls only 20 per cent. had died. In the third experiment all were dead on the eighth day, and 6 out of 14 died of the disease. At higher temperatures flies die more rapidly, mostly within 3 days. He states that the fact that infected flies can live for several days points to the probability of their playing an important part in the dissemination of the plague, as they have plenty of access to food into which they might fall and die, or on which, in again feeding, they would deposit their excreta laden with plague bacilli. Lord[30] fed flies on tuberculous sputum, 10 to a field. Out of 30 flies, 26 died in 3 days, the remaining ones becoming inactive. Of the controls, 6 flies confined and fed on nontuberculous sputum were all found dead in 2 days. Of 6 others fed on water, sugar, and meat, and similarly confined, 2 died in 2 days; the remaining 4 were alive at the end of the week. A writer in the *Healthy Home*[52] found that confined flies fed on tuberculous sputum died within 2 to 3 days; controls, fed on clean milk, 8 to 10 days.

Experiments have been made to demonstrate how long bacilli would remain alive when dried on the external parts of the fly. From flies caught in an autopsy room at Hamburg during a cholera epidemic, after feeding on cholera bacilli, allowed to fly around awhile and then recaptured, roll cultures were taken at intervals, giving positive results even after an hour and a half had elapsed,[4] and cultures were obtained from the tubes of the feet after 17 hours.[43] How long organisms will remain alive in the gastrointestinal tract of the fly has been investigated by several experimenters. Although the number is not sufficient to be conclusive in each instance, still their results are entertaining. Cholera bacilli were found in flies' dejections as early as 17 hours after feeding and as late as 4 days.[24] The bacilli of typhoid fever were

found in the dejections as late as 23 days,[20] and tubercle bacilli as early as 18 hours.[20]

If the secretions of the gastrointestinal tract be not inhibitive, and bacilli remain long enough in the same at a proper temperature, there is a possibility of their increasing in number. This has been noted at least twice. Lord[20] found that the bacilli in fly specks had increased in size and showed evidences of branching. The bacilli in the field numbered 10, and in the dejections 150. The strongest evidence, and the one least controverted, is the trinity of laboratory experimentation, the finding of pathogenic germs in the interior of the fly, the development of the same by cultures, and the production of disease conditions through inoculation. Numerous observers have taken the trouble to verify their suspicions.

Bollinger[2] proved the presence of anthrax bacilli in the stomachs of flies. Marpmann[24] squeezed fluid from the proboscides and ani of flies which had fed on erysipelas bacillus, and found cocci and bacilli. He also fed them with nutriment containing the bacillus prodigiosus and bacillus fetidus, with like results. Maddox[24] (1885) found live bacilli in their dejections. Spillman[24] and Haushalter[24] found tubercle bacilli in the abdominal cavities of flies caught in a consumptive's room, also in specks scraped from the walls and windows of hospital wards for consumptives. They fed flies on tubercular sputum, and proved the presence of tubercle bacilli in the intestines of flies and in their excrements. Hofmann[3] made similar experiments and found bacilli in 4 out of 6 flies. Anthrax bacilli were found in flies' dejections by Celli[24] and Alessi.[24] Stiles[24] found the eggs of the ascaris in the larvæ and in the adult fly. Simmonds[4] (1892) examined flies present in an autopsy room at Hamburg and found bacilli in large numbers. Recognizing the source of danger, he ordered the bodies sewed up and the tables cleansed, after which no bacilli were found in the flies in the room. Uffelmann[5] allowed a cholera-infected fly to drink out of a glass of sterile milk, and, after keeping the latter at 70° F. for 17 hours, found each drop to contain about 100 organisms. Yersin[28] (1894) also found living bacilli by microscopic examinations. Billings[11] found anthrax bacilli in the stomachs and intestines of flies collected from the body of an infected steer. Raimbert[24] made the first microscopical experiments concerning anthrax in flies in 1862. He kept flies in a bell-jar containing a vessel of anthrax blood diluted with water. After the flies had drank the fluid and soiled their bodies, he found bacilli in their proboscides in 2 hours, and later in the excrements.

Grassi[24] fed flies on water containing tænia sodium. The eggs came away unaltered in the flies' dejections. He also experimented with the oxyuris and trichocephalus, and caught some flies whose intestines were full of eggs. Similar results were obtained with the oidium and botrytis. Macrae,[24] in India, 1894, exposed boiled milk in different parts of a jail where cholera and flies prevailed. High walls separated the male from the female department. There were no cases of cholera on the female side, but the milk on the male side became infected with

cholera germs. The milk in the cow-shed was also infected. Lord[30] made sections of flies fed on tubercular sputum and found bacilli in the intestines, but there was no invasion of the other parts. On the examination of fly specks the bacilli appeared in the stools within at least 18 hours. Examination of many specks showed that the number of bacilli to a field increased from 3,000 to 5,000 bacilli. About 2,000 specks had been deposited by 30 flies in 3 days; thus from 6,000,000 to 10,000,000 tubercle bacilli had been transferred from the sputum to the inner side of the flies' cage during this period. Raimbert's[24] investigations prove that house flies which live upon flesh and blood carry the poison on their feet, wings, and in their dejections. In 1862 Davaine[24] made observations on the spoiling of fruit and vegetables, which he traced to flies that carried the spores of penicillium and mucor, and infected the wounded places on apples, etc. Tizzoni[24] and Cattani[24] caught flies in cholera wards, secluded them for hours, took cultures, and found cholera bacilli. Swatchenko[24] culturally found spirilla in flies' dejections after 2 hours. Uffelmann[5] experimented with 2 flies; the first yielded 10,500 colonies, and the second 25.

Hart[14] and Smith[14] cited an experiment by Burgess, who fed flies on bacillus prodigiosus and then allowed them to fly into a large room. After a few hours they were recaptured and made to walk over slices of sterilized potatoes, on which later were found vigorous growths. Smith[17] experimented with house flies walking over alternately sterile Petri dishes, and one with diphtheritic growths, thereby inoculating the sterile. Veeder[18] made cultures of bacilli from fly tracks and excrements, the flies having fed on the dejections of typhoid and dysentery patients, thus showing the possibility of these diseases being spread by flies. Sangree[20] experimented with anthrax cultures on a wingless fly, allowing it to walk over first the culture plate and then over sterile agar, demonstrating the colonies which grew from the same. Ficker[30] isolated typhoid bacilli in bodies of flies caught in houses where people were ill with typhoid fever. He experimented to determine how long bacilli would live within the bodies of flies, and found the extreme limit to be 23 days after feeding. Hayward[38] fed flies on bacilli contained in tubercular sputum, cultures developing the same. Chantemesse,[48] writing on the propagation of cholera from house to house, makes flies the most important factor. His experiments proved that one could obtain cultures of cholera after 17 hours from the feet of flies and from their intestinal contents. Similar experiments and results were obtained by Celli[24] and Alessi.[24] Davaine[24] inoculated guinea-pigs with proboscides, legs, and wings of flies removed directly from a jar. The animals died of anthrax. He also fed flies on anthrax blood for 24 hours, then after that sugar water for 1½ to 3 days. Four flies died of anthrax and three survived. He believes that flies are a most important means of spreading anthrax. Proboscides from flies which had sucked upon the erysipelatic leg of a horse were inoculated into healthy horses, and produced effects similar to inoculations made with

the excretions themselves, and the proboscides contained bacteria similar to those seen in the wounds.[24]

Celli[24] and Alessi[24] proved, both by cultures and by inoculations, that flies' contents give off virulent anthrax bacilli. In their experiments on domestic flies they proved that the *Staphylococcus pyogenes aureus* was unaffected in its virulence by its passage through the fly's intestines. Celli (1888) fed flies with tubercle bacilli and inoculated the anterior chamber of the eye of a rabbit, developing tuberculosis in that animal. Flügge[24] experimented with the bacilli of anthrax, typhoid fever, spirilla, and *Staphylococcus pyogenes aureus* and found them virulent after passing through the intestines of the fly. Simmonds[4] proved that bacilli retained their virulence when adherent to flying insects for an hour and a half after drying. Swatchenko[24] experimented on flies with pure cultures of cholera bacilli, and the bacilli were found in the excreta and bowels as late as 4 days later. When inoculated they were found to be as active as pure cultures. The same results were obtained when the flies were fed on choleraic dejections. Hoffmann[3] fed flies on tubercular sputum, and 24 hours after being fed bacilli appeared in the excreta of the flies, and 3 guinea-pigs inoculated with their intestines died with tuberculosis. The presence of plague bacilli in the intestines of flies has been demonstrated repeatedly. Yersin,[24] in 1894, noting the large number of flies where victims were being autopsied, crushed one fly and inoculated it into a guinea-pig, which died of the disease in 48 hours. Twelve hours after flies had been infected, Marpmann[24] (1897) inoculated their contents into mice. His experiments were not complete, in that although the mice died, not all of them died from the infection. Hayward[38] fed house flies on bacilli contained in tuberculous sputum and proved it by inoculation.

To test the virulence of bacilli in specks, Lord[39] protected glass jars from direct light. Guinea-pigs were inoculated with 100 specks each, scraped from the flies' eggs at intervals of 1, 8, 15, 28, and 55 days. The first inoculation was made subcutaneously and the other intraperitoneally. The animals were killed after 5 to 7 weeks. Tuberculosis was produced by the inoculated material in the first 3 animals, showing that virulent bacilli were present in the specks for at least 15 days. The pig inoculated with specks which had dried for only 1 day showed generalized tuberculosis. The pig inoculated with the specks which had dried for 15 days presented large, isolated, tuberculous lesions of the spleen and of two lymph glands, one in the gastrohepatic omentum, and the other in the anterior mediastinum. Tubercle bacilli were demonstrated in these lesions.

An interesting condition which occasionally occurs is due to the ingestion of fly larvæ by human beings. Certain species of the larvæ of flies are capable of reproducing larvæ,[9] which accounts for the gastroenteric condition with which they are associated. Bachmann[10] found larvæ of the common house fly in the vomitus of a hard drinker, and the same were found by Cohen[12] in the dejections of a nursing infant. Another writer[9] cites a case in which fly larvæ in large masses

were passed in the stools, and a case is cited by Cattle[50a] in which large quantities of dipterous larvæ were passed per annum. Stiles[34] found the eggs of the ascaris in the larvæ of flies.

Disease conditions and associated states accurately observed must be considered scientifically as trustworthy experiments as those done in laboratories. A change in the water supply from foul to pure, with the incident reduction in enteric conditions, demonstrated as positively the source of typhoid fever as any inoculation of pigs. Not until the Spanish-American War, in 1898, did we realize the importance of the fly question in the dissemination of typhoid germs. The Civil War gave us modern hospital construction, so this latter, the Spanish-American, may result in proper relegation of aërial diffusion of disease, and the placing of diffusion by flies more prominently. Sanitation in the army at this time was not as carefully pre-arranged as it should have been, and as it was at the time of Moses.[6] The fly factor was not unknown, and yet no provision was made in the sanitary regulations to prevent the dissemination of the ever-present typhoid fever by these agents. Not only were the contents of the latrines exposed, but the men wandered through the woods defecating indiscriminately. Quoting from Reed, Vaughan, and Shakespeare's Report on the Spread of Typhoid Fever in the United States Military Camps during the Spanish-American War of 1898:[48] "Typhoid fever progressed even in those who did not drink the suspected water. Notwithstanding the purity of the water supply, and contrary to the opinion generally accepted by the medical profession, we find typhoid fever, having been imported into various company organizations, now steadily advanced. The disease is attributed to the fouling of the ground, inevitable in camps, the lack of sufficient conservancy establishments, and the contamination of food through the agencies of dust and flies. * * * Flies swarmed over fecal matter and then visited and fed upon the food prepared for the soldiers in the mess tents. In some instances, where lime had recently been sprinkled over the contents of the pits, flies with their feet whitened with the lime were seen walking over the food."

Not until a spade and an armed soldier were placed at each latrine did the fly menace cease and typhoid fever diminish. As each man defecated, he was compelled, with his spade, to dig up enough earth to cover his excrement, the sentinel seeing that such order was carried out. No sadder, more humiliating, yet successful experiment has ever been noted. Buchanan[9] relates an attack of cholera in the Burdwan jail, where the water supply was above suspicion, and the same for all the inmates, who were divided into groups, separated by a high wall. One group had their victuals cooked separately and were fed in separate places. The ones fed close to the latrines, where choleraic discharges were thrown, became infected with cholera, while the other group escaped. It was fly year, and flies were seen to come and go between the food of the inmates and the discharges in the compounds. In 1850 the ship *Superb* had cholera on board. She was at sea for

six months. On putting to sea flies were in great force, but after a time disappeared, and with them the epidemic. Going into Malta the flies again appeared from the shore and cholera increased. Again putting off to sea, the flies disappeared, with the coincident subsidence of the disease.[6]

Alice Hamilton[22] sums up the result of her study into the part played by the common house fly in the recent epidemic of typhoid fever in Chicago, which could not be explained wholly by the water supply nor on the grounds of poverty and ignorance of the inhabitants, as the section infected did not differ in these respects with several other sections. The streets in which the sanitary arrangements were worst had the larger number of cases. Flies caught in undrained privies, fences, walls of the houses, and rooms of typhoid fever patients, showed typhoid bacilli in 5 out of 18 cases. Further, she states that when the dejections of a typhoid victim are left uncovered in privies or yards, flies may be an important agent in the dissemination of the disease. Hewlett[45] noted an epidemic of flies coincident with an epidemic of enteric diseases among children, in which the diseases affected alike all classes, under conditions sanitary and unsanitary.

How diseases are transmitted, and the most probable source in each circumstance, have naturally been the cause of much argument. As the science of medicine has become more exact, and as the methods of experimentation allow of more logical deductions, so have some of the opinions once thought worthy lost in favor. Naturally, several channels exist, some always dangerous, others occasionally so. The possibilities of aërial dissemination of pathogenic germs, once holding the confidence of the profession, has been seriously attacked. How important flies may be in the dissemination of diseases will largely depend upon other existing conditions. The observations referred to herein conclusively prove the possibility of the spread of any type of infectious disease by this insect. It has been aphoristically stated that "the three great means for the transmission of typhoid fever are fingers, food, and flies,"[36] and the authors hold the last to be the most important. If this be true of typhoid fever, why not of any other microbic disease? The part of the fly most active for harm is undoubtedly the portion which most carefully protects the contained microbe from sunlight and desiccation. From the experiments recited the relative danger is as follows: the dejecta, the proboscis, the crushed or ingested insect, and the outside parts.

Scientifically speaking, the number of flies in a community is in direct proportion to the carelessness of its sanitation. The housekeeper will spend a day rummaging over a bed for a bedbug, and give little notice to a kitchen full of flies. "The presence of flies in a house is a reproach, falling away from the high hygienic standard, for the fly is a pestilential fellow."[33a] Fly epidemics are generally local ones spreading slowly from the source of first infection. Winds, by carrying the flies, allow of spread in their direction. As a working hypothesis, which is both logical and reasonable, one can explain the sporadic occurrence

of epidemic diseases, such as remote cases of cholera, which are not native and existing in quarantine. Further, it has been repeatedly asserted that in the zone immediately surrounding a smallpox hospital new cases are more frequent than at a distance. There are two ways to explain this condition—the wafting out of the building of infected particles, or the carriage by flies. The latter seems more probable, for outward drafts are never vigorous, and hardly sufficient to carry a distance. Every privy, every open window, every dead animal in the street, expectorations of people suffering or incompletely recovered from any infectious disease, the nares of scarlatinal patients suffering from catarrh or acquired colds; in fact, all conditions where pathogenic bacteria or intestinal parasites may openly exist, make possible, and even probable, the spread of disease by flies. This, being known, should be acted upon. There are few Boards of Health as intelligent and far-sighted as that of Philadelphia, which has taken vigorous measures to protect the public against infection of food by flies. Inspectors are directed to visit all milk houses, butcher shops, grocery and candy stores, and instruct the owners to place a covering over all articles. The order reads:[47] "The chiefs of divisions of nuisances, milk and meat, and cattle inspectors are hereby instructed to visit all retail dealers exposing for sale in front of their properties meats, fish, vegetables, fruit, candies, and cake and instruct the proprietors that a covering of some suitable material must be provided to protect the goods so exposed from flies and insects generally."

When mosquitos were discovered to have a part in the dissemination of malaria and yellow fever, it was thought that a prevention of their breeding was too great a proposition, yet it has been satisfactorily accomplished, so that now one case of yellow fever in all Cuba will create more comment in the daily papers than at one time an epidemic in Havana. Certainly when the profession and the laity become alive to the dangers incident to the presence of flies, and recognize in them a receptacle and a carrier, then will the problem be attacked and solved. Attached to all stables there should be built a pit of sufficient size, closed tightly with the exception of a ventilating window properly screened, and so constructed that little direct light may enter. Manure, as soon as dropped from the animal, should be pushed into this pit, and chloride of lime or crude oil frequently scattered over its contents. All organic filth, such as human manure, if conditions do not allow of a sewerage system, should be covered immediately by sufficient earth. All offal and organic débris, in which flies can lay their eggs and propagate, should be disposed of, secluded, or screened. Hospitals, particularly where contagious diseases exist, and rooms containing the same, should have all windows and doors carefully screened, and every effort be made to rid the interior of such flies as may enter. All food, particularly milk and such articles as are eaten uncooked, should receive full attention and protection.

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SANATORIA, THEIR ADVANTAGES AND LIMITATIONS.

By Irwin H. Hance, M.D., Lakewood.

A residence of nearly five years in The Adirondack Cottage Sanitorium, when it was the only sanitorium in this country for the treatment of tuberculosis, gave me a knowledge of its value and workings which could be secured in no other way. Since then many sanatoria have been established, and each year closes with an increasing number of such institutions, both State and private, and the outlook for the consumptive becomes a brighter one; whereas, formerly he had almost nowheres to go for help and treatment, now he is able to get treatment and advice close to home.

The advantages of the sanatorium to the individual are both direct and indirect. First, as regards treatment: The disease is a slow, chronic one, and the treatment, consequently, a long one. It is most exacting as to details and the best results are secured by those who are familiar with the varying types of the disease and all the minute details of the treatment. In other words, the patient must be under close observation all the time, and as his means are usually limited, this can be best secured in a sanatorium. Consumptives were formerly advised to go West, buy a broncho, live in the saddle and get well; now the trend of most teachings is drink all the milk possible, fill up on raw eggs, eat all you possibly can and stay at home. As a result, patients get the impression the disease is more easily cured than is possible, and thereby lose, or minimize, their chances of recovery, which is greatest during the early stages of the disease.

The greatest direct value to the patient is the instruction which he gets in a sanatorium and the encouragement to follow out the treatment most faithfully resulting from his association with the other inmates. He learns accurately what the disease is, what causes it and how it can be cured, and lastly how he can prevent re-infection of himself and avoid infecting others. He thus secures a sufficiently accurate scientific knowledge of the subject to enable him to follow out willingly and wisely the orders of his physicians while resident in the sanatorium, and when dismissed he is capable of spreading broadcast his knowledge.

This educational training of the individual is the weightest factor for good in the great problem of the crusade against tuberculosis; each man or woman becomes a missionary in the propagation of the information, the value of which affects the individual in his better care of himself, particularly as regards hygiene; the family in the greater protection which he safeguards them with; the community-at-large by reason of

the removal of one more focus of infection, and through the spread of the knowledge which he is sure to make use of for the welfare of himself, as well as his fellows.

The results of sanatorium treatment are given by Laurason Brown, for the Adirondack Cottage Sanatorium:

In a summary of 1,500 cases discharged from the Adirondack Cottage Sanatorium from two to eighteen years, he gives the following: 1,066 patients were traced, 434 untraced. Of these 1,066, 46.7 per cent. are still living; 30 per cent. are well; 6.5 per cent. arrested; 4 per cent. have relapsed; 5.2 per cent. are chronic and 53.3 per cent. are dead. In other words, nearly one in three of all classes of patients treated remained well after two years or more.

Vincent Y. Bowditch states that in seventy-nine of the one hundred and sixty-four patients treated at Sharon, fifteen miles out of Boston, the disease was recorded as arrested, being 48.17 per cent.; of these twelve, or 15.2 per cent., have died since leaving the institution. "The majority write enthusiastically of their good health, some of them having left the sanatorium ten years ago. All are employed in their homes, or in occupations which, as a rule, allow them to be out of doors more than before."

The limitations of a sanatorium are due chiefly to two factors—the expense and the small number of people who can be accommodated. The original outlay for the plant must necessarily be considerable. Of late great reductions on the buildings for the patients have been brought about by constructing houses with lean-to attachments, whereby the patients all sleep out of doors and use the central part between the two wings for assembly and dressing-rooms. Naturally, the expense for food is a very large one, as this is the fundamental part of the treatment. To secure any result a minimum of six months' treatment is requisite; thereby vacancies are infrequent and the actual number of patients accommodated is relatively lessened. As regards the patient, this enforced long absence from work and home entails added hardships upon himself and his family, and prevents many a person from remaining in an institution as long as he should .

In summing up the question, I wish to present to you a letter from Dr. Trudeau, who has had a larger and wider experience in the treatment of tuberculosis than any man living in this country, and also one from Dr. Bowditch, who, next to Dr. Trudeau, has had the longest experience in sanatorium treatment of this disease.

October 17th, 1906.

"Dear Dr. Hance:

"In reply to your question as to my opinion about the value and limitations of sanatorium treatment for tuberculosis, I can say that from an experience of over fifteen years with sanatorium treatment of tuberculosis at Sharon, Mass., and more recently with seven years' experience at the State Sanatorium at Rutland, Mass., I am thoroughly convinced that in the great majority of cases it holds out

more hope of permanent recovery than any other method. It goes almost without saying that it is not suitable for *every* case of consumption, and especially in cases of far advanced disease, where lack of vitality makes the rigorous methods employed in winter unsuitable; but for the hopeful cases it holds out, in my opinion, the best prospects of relief.

"The supervision of patients, who are told what to do and what not to do at a critical time of the disease, when errors in diet and over-exercise may do harm, I regard as the chief factor in bringing about favorable results, rather than the special influence of climatic conditions. In saying this, however, now that so many successful results have been obtained by less radical methods, I do not wish to be classed with those who hold the extreme view, as it seems to me, that change of climate never need be urged, for in certain cases I believe that such a change is followed by the most beneficial results.

"As to the educational effect of sanatoria upon the public, I believe it cannot be over-estimated. Each patient acts as a missionary in the community to teach the value of good food and fresh air as a means of prevention, as well as cure of disease. In this fact lies the chief and great benefit to the human race of such institutions.

"Believe me,

"Yours very truly,

"VINCENT Y. BOWDITCH."

Suggestions for Obtaining a More Complete Registration of Births in New Jersey.

BY DAVID S. SOUTH, STATE REGISTRAR OF VITAL STATISTICS.

In making suggestions for a more complete registration of births in New Jersey it is well to state that at the present time only about sixty-five per cent. of the births that take place are reported, while ninety-five per cent. of the marriages and ninety-nine per cent. of the deaths are filed according to law. A large number of the five per cent. of marriages which are not reported are performed by the Catholic clergy, who are not ignorant of the law, but who regard the church records as sufficient. In regard to the one per cent. of deaths not reported, the negligence is due to coroners who are ignorant of the law, and in instances where two or more physicians have attended a case and each depends upon the other to make the report. The credit for the fact that deaths are promptly reported is not entirely due to physicians, as in two-thirds of all the certificates received for filing the undertaker has filled

out the blank, with the exception of the cause of death and the signature of the physician. The undertaker's reason for thus expediting the matter is due to the fact that he is not allowed, under the law, to bury a human body without a burial permit, which is only obtained in exchange for the certificate of death. As there is no such requirement for the reporting of births, it appears that the negligence of many physicians concerning the provisions of the law relating to vital statistics is thus shown to be habitual.

At the last session of the Legislature a bill was passed changing the present registration law, which provides that a certificate of birth shall be filed within thirty days after the event, and allows only five days in which to file the certificate. The bill in question contained many important changes from the present system, all conducive to a more complete and accurate collection of vital facts. The bill failed to become a law. A careful comparison of the bill with the present law will show many important changes, and we were advised by the Attorney-General's Department that the changes could best be obtained by a complete revision.

Information furnished by the State Department of Labor shows that the most essential requisite for the proper enforcement of the child-labor law is a complete and accurate registration of births. The department referred to investigated some five thousand cases last year, four-fifths of which were American-born, and in less than two-fifths of the American-born children were public records available. To be more accurate, out of every hundred cases investigated of American-born children, public records were found for only thirty-five. In speaking of child-labor, Samuel McCune Lindsay, Ph.D., recently said that child-labor presents the greatest moral issue that the American people have had to face since the Civil War. It will easily be seen that a complete and accurate registration of births will prevent the employment of children under the legal age. It will also prevent the deception now practised of showing the factory inspector a bogus certificate, and will enable our children to secure the education so necessary for their future welfare.

As long ago as 1836 the citizens of Massachusetts began to protect the children of that State by enacting a child-labor law, together with a perfect registration law requiring the reporting of all births. Massachusetts is now paying twenty-five cents for the reporting of each birth, and many other States to-day are paying for the filing of these vital facts, a duty which the professional attendant owes to his client, his State and his country. Physicians are a privileged class; they are exempt from jury duty and may speed their motors or horses without molestation, yet they fail to protect their patrons by filing the vital facts concerning said patrons and their descendants. Dr. Arthur R. Reynolds alludes to the matter in the following words: "There is hardly a relation in life, from the cradle to the grave, in which the evidence furnished by an accurate registration of births may not prove to be of the greatest value; as, for example, in the matter of descent; in relations

of guardians and wards; in the disabilities of minors; in the administration of estates; the settlement of insurance and pensions; the requirements of foreign countries concerning residence, marriage and legacies; in marriage in our own country; in voting and in jury and militia service; in the right to admission and practice in the professions and to many public offices; in the enforcement of laws relating to education and to child-labor, as well as to various matters in the criminal code; the irresponsibility of children under ten years of age for crime and misdemeanor; the determination of the age of consent, etc. As the country becomes more densely settled, and the struggle for existence sharper, many of these matters which have hitherto been of minor significance will take on a deeper meaning and acquire greater importance. Hence, the urgent necessity for remedy of the defects which prevent a proper registration of births."

In our efforts to obtain a complete registration of births for statistical information, we must not overlook the fact that the records are available for many other purposes, and agree to a law enabling any householder, manager or superintendent of a public or private institution, or any other person having cognizance of the facts, to file a certificate of birth, as is permitted by the laws of Michigan and other registration States. The professional attendant at a birth, or the parents only, should be allowed and required to file a certificate of the birth. The advantage of this requirement would be to prevent fraudulent registration, as is sometimes attempted where the settlement of large estates and other important legal and financial questions are involved. During my experience in the State Bureau of Vital Statistics several cases of attempted fraudulent registration have come under observation.

To successfully complete the work of registration of vital facts we must have the co-operation of local boards of health. These boards should appoint local registrars of vital statistics, who are intelligent and firm, for upon the registrars largely depends the enforcement of the law. At the coming session of the Legislature of New Jersey another effort will be made to successfully pass a law requiring more prompt and accurate filing of births, marriages and deaths, and the endorsement of the New Jersey Sanitary Association favoring such a law would undoubtedly aid materially in securing its enactment.

The Suppression of Nuisances in New York City.

By Thomas Darlington, M.D.,
Commissioner of Health of New York City.

The nuisances arising in a great city like New York readily classify themselves under two broad, general headings:

First, those affecting health and life, either of any person or persons, or of the community at large, and second, those interfering with comfort and repose of any considerable number of persons.

The Commissioner of Health is charged with and has the power to enforce all laws relating to the health of persons in general, and the suppression of public nuisances naturally claims a large part of his thought and attention. It is a fact, often disregarded by complainants, that were he to devote his time and energies to abating the minor nuisances mentioned in the majority of complaints received, there would be practically no time left to deal with the worst offences; those that affect the health of the city as a whole. With mere private nuisances he can have no concern, except in so far as he is able to investigate them and determine their real character.

The right of a citizen to a quiet, healthful and peaceful life is undisputed, in so far as it does not seriously interfere with his neighbor's equal right, and this is as true from one point of view as from the other extreme. It is often a point of great delicacy to determine whether a so-called nuisance is, from its nature, justifiable and to render justice to the assumed offender as well as to the offended. Section 385 of the Penal Code declares a public nuisance to be a crime against the order and economy of the State, and consists in unlawfully doing an act or omitting to perform a duty, which act or omission, among other things, annoys, injures, or endangers the comfort, repose, health or safety of any considerable number of persons.

In a community of any size one fact must always be kept in mind: an act or condition which might well be considered a nuisance in a country town and, as such, demands immediate suppression, may be a necessary and concomitant part of the life incident to a city. In other words, we must adjust our benefits and disadvantages, and he who seeks the joys and commercial opportunities of city life can hardly expect the repose and freedom of life in a small country town.

In a recent paper read before the Medico-Legal Society in New York, I quoted some interpretations of the law relating to public nuisances, and it would be well to repeat them here: "If a man makes unreasonable, unwarranted or unlawful use of his property so as to produce material annoyance, inconvenience, discomfort or hurt to his neighbor, he will be guilty of a nuisance to his neighbor, and the law will hold

him responsible for the consequent damage." "Reasonable use cannot be defined by any general rules, but must depend upon the circumstances of each case." "To constitute a nuisance, the use must be such as to produce tangible and appreciable injury to neighboring property or such as to render its enjoyment specially uncomfortable or inconvenient."

These interpretations of the law cover in an admirable manner the question of the commission, or maintenance, of a nuisance. Certain noises, and other nerve-racking or peace-destroying instances, may often interfere with the comfort of individuals and, so far as they are avoidable, should be suppressed. On the other hand, many of them are a vital part of commercial and urban life and their suppression would work great and unwarranted injury to business interests. This distinction may be well illustrated by comparing on the one hand the noise of the elevated or surface railways caused by the usual running of the cars or trains, a noise impossible to subdue; and, on the other hand, the pounding of so-called "flat wheels" on the same cars. The latter is wholly the result of neglect, and is an unjustifiable interference with the rights and the peace of mind of the community. Orders against the street railways of New York for the suppression of this particular nuisance have been made in many instances, and the nuisance abated. In this, as well as in innumerable other cases, however, eternal vigilance is necessary, and our results must be judged, not by the fact that a person hears or sees an occasional flat wheel, but by the fact that he does not hear or see them constantly.

"When a business is lawful, and is conducted in a reasonable, ordinary and lawful manner, there can be no intervention by public officials; when the business is lawful, but conducted in an unreasonable or extraordinary manner, then something may be done."

I trust I have made clear the attitude of the Board of Health of New York City toward this most important subject. Possibly no other city department comes into closer and more intimate touch with the people than the Department of Health. Because its functions are those of preserving the health of the community it has an almost paternal relation to each citizen. That the people assume this relationship is graphically shown by the character of the letters coming in almost overwhelming numbers to us. Every written complaint, unless anonymous, receives an answer. All complaints, anonymous or not, are immediately investigated and action taken, where the result of the investigation justifies such a course.

Our force of inspectors is constantly on the alert for violations of the Sanitary Code. Public nuisances are dealt with by an order from the Board of Health, to the offender, for its abatement. Reinspection is made to ascertain if the order has been complied with; if not, the matter is referred to the Corporation Counsel, who warns the offender that legal action will be commenced if the nuisance is not immediately abated; further non-compliance is met by summoning the offending party to court, where the matter is adjusted on its legal merits. Only

against the worst class of offenders is this last measure necessary, and these cases are in a minority; by far the greater number comply with our requirements after a single warning or order of the board.

When individual complaints of minor offences are received, they are investigated. If the complaint is a personal one and affects simply the repose and comfort of one, or a few persons, an effort is made to adjust the difficulty. If this fails the complainant is told that he must personally summon the offending party to court and the department offers to submit such evidence as it has acquired. These minor complaints are vast in number, and of almost every conceivable variety. They include the shaking or beating of rugs and carpets, the barking of dogs, midnight concerts of cats, crying babies, too persistent piano playing in an adjacent flat or house, noisy parrots, and some of an even more personal nature, such as invasion of bed bugs or cockroaches, or personal dislike and petty complaints of neighbors. Personal investigation, tact and common sense usually suffice to bring about an adjustment of such difficulties; yet they constitute a very real annoyance to the complaining parties, and the relief which may be afforded is well worth the time and patience expended in the effort.

Public nuisances dealt with include smoke, badly-conducted and unclean slaughter-houses, unnecessary noises, promiscuous spitting and the conduct of any private or corporate business in such a way as to render it a menace to health, or a disturber of peace.

All complaints received by the Department of Health are classified and referred to the proper division for investigation and appropriate action. By far the greater number are attended to by the Division of Inspections, but all are under the jurisdiction of the Assistant Sanitary Superintendent of the borough directly involved. The procedure already outlined is used in dealing with complaints, but if the matter is urgent permission may be obtained by the Assistant Sanitary Superintendent from the Commissioner of Health, the corporation counsel, or the Secretary of the Board of Health to make an arrest and bring the offender directly before the Criminal Court. In proceeding against a corporation it is the practice to first arrest the employee who is the immediate offender, in order to establish the fact that a nuisance exists; then the corporation may be summoned to court, and any officer of the corporation may represent it in the proceedings. Noises and smoke are the nuisances most generally complained of by the general public, for they affect, by their nature, large numbers of persons.

New York is justly proud of its clear atmosphere and clean buildings; it offers a marked contrast in this regard to that of any other large city in this country, and it is the constant endeavor of the Department of Health that it shall keep this reputation so justly earned. Smoke in quantities sufficient to pollute the air or deface the buildings is entirely avoidable. It is not a question of the burning of soft coal; anthracite improperly burned may be productive of much smoke, while bituminous coal may be stoked in such a manner as to be inoffensive. It is a question merely of properly-constructed furnaces and

skilled firing, with complete combustion of the fuel. Section 96 of our Sanitary Code states that in any premises upon which a locomotive, or stationary engine, furnace or boiler are used smoke shall not be allowed to escape, or be discharged to the annoyance or detriment of any person or persons not being therein or thereupon engaged. And further, that every furnace employed in the working of engines by steam shall be constructed so as to consume the smoke arising therein or therefrom. Numerous convictions have been obtained by virtue of this authority. Railroads having terminals within the city limits have been in the past persistent violators of this law. During the past year they have shown special disregard of the rights of the public, and the Department has waged a vigorous crusade against this offense. Several large manufacturing concerns have also renewed activity in this direction, but the offenders have been promptly apprehended and made to obey the law. It must be admitted that no large city, with its varied industries, can be kept absolutely free from this annoyance. Disregard of the rights of others is a sad commentary upon our boasted civilization; chances to evade the law are quickly seized, and this is true no less of the little offender than of the great. Business interests must be conserved, it is true, yet if the ingenuity and money used to escape the consequences of the violation of this law were spent in efforts to comply with it we should have little cause for complaint. This smoke nuisance is probably the least justifiable one with which we have to deal. It is entirely avoidable and might be completely eradicated without serious injury to any vested rights, while its continuance is a menace, not only æsthetically, but from the standpoint of health. We are determined it must and shall cease. Every opportunity is given for compliance with the law, and it is our endeavor to proceed so that no hardship may be endured by any business interest, but when repeated warnings and orders are disregarded the right of law may be conscientiously invoked.

In facing the problem of noise, we are dealing with a very different proposition. Dragging metal rails through the city streets is a particularly irritating form of this annoyance, and we have caused its almost complete disappearance. We have also an ordinance against unnecessary noises within certain limits of approach to schools and churches, where the right to quiet and uninterrupted enjoyment of silence is unquestioned. The ordinary pursuit of business and social life in a city render a large part of its noise necessary and unavoidable. A man engaged in a lawful business cannot be restrained if his engines pound, or his dynamos whirr, unless it can be proved that the noise produced, or the annoyance caused, is out of proportion to the reasonable conduct of that business. If an engine is so placed in a manufacturing concern as to cause considerable disturbance to the adjoining owners or lease-holders, and if placing the engine in another portion of the building would obviate this discomfort and not interfere with the legitimate pursuit of the business, we have every right to insist that the change be made. Business noises in an otherwise residence

section may properly constitute a nuisance when the same noise in a manufacturing section of the city would pass unnoticed and be taken for granted.

The playing of a hand-organ in front of a school or church may properly be a subject for complaint, while the same organ in another part of the city might be a source of actual pleasure. Anyone who has watched the crowds of singing and dancing children grouped around one of these disputed producers of sound may prove this any day to their own satisfaction. The poorer part of our population are entitled to their enjoyment of that particular brand of music in the street, as much as the well-to-do are entitled to their concerts and opera. We may not agree with their taste, but we must concede their right. Noise we must endure, unless we choose the life simple, instead of the life complex. Piano-playing may be a symphony of sound to the player and a source of agony to the unwilling listener, but it would require a veritable Solomon to decide so delicate a question. We in the city, that is, most of us, take our share of the noise with stoical calm, and if we do not grow to like it, at least we regard it with mild complaisance and often become so inured that we notice it scarcely at all. You may all be familiar, and feel sympathy, with the little city girl who turned unexpectedly from a country visit with the statement that it was too noisy there: the crowing of the roosters, the croaking of the frogs and other sylvan sounds kept her awake at night.

Surrounded by rivers and the bay, and with its large maritime interests, New York continually faces the question of unnecessary river noises. That the whistles of tug boats and other craft are often sounded without legitimate cause is true. The whistles are used for the purpose of signalling, and such use is required by Federal authority. There is no doubt that they are often blown for no particular purpose, and, as a matter of fact, we have the right to suppress them, but it is a difficult matter to decide, in any particular case, the exact border line between their right and wrong use. It must be conceded that signals are a vital part of water traffic, and, so long as the signals are of such a nature, we must submit to some annoyance. Safety and public policy demand their continuance.

In New York city at the present time there are in progress two large public improvements of an extensive nature; I refer to the terminals of the Pennsylvania and New York Central Railroads. These works have been productive of many complaints, such as noise from the machinery, smoke from the engines and flooding from broken water-mains and sewer pipes. It is but just to say that the contractors have shown a most commendable spirit in meeting the Department half-way in the adjustment of difficulties, and, considering the vast and complicated nature of this work, it is now being carried on with as little disturbance as could reasonably be expected. I have cited these instances to show with what large problems we have to deal. Discomfort must sometimes be endured in order that greater good may result. Yet, we have reduced this discomfort to a minimum.

During the recent agitation regarding slaughter-houses and their products, in spite of the fact that the Department was handicapped by having too few inspectors, it was a just cause of pride to us that the conditions revealed during a thorough investigation were excellent. This industry could, by its very nature, be a serious nuisance and menace to public health. It may be a surprise to many people to learn that there is any need of such an industry within the limits of New York city. We have resident with us a large Jewish population. The Orthodox Jew will eat meat or poultry only when it is "kosher." This means that it must have been slaughtered according to certain rules and regulations within three days of its consumption. It will be readily seen that the importation of such meat from any distance is not practicable; therefore, we have an extensive industry which must be supervised. As a result of public demand, we have been able to increase the force of inspectors assigned to this duty, and nuisances arising from this source are now practically extinct. In this connection it is of interest to quote a few figures to show the extent of this industry. During 1905 a total of 3,080,751 cattle, sheep, calves and hogs, and 4,366,297 heads of poultry were slaughtered within the city limits.

The collection and transportation of stable manure, fat and bones, garbage and grease would, unless restricted, constitute a great public nuisance. In New York this business is carried on under the direct supervision of the Department of Health. Every person who wishes to engage in work of this nature must obtain a permit from the department. These permits are issued on application, after certain requirements have been met. All places where the materials are delivered are kept under constant supervision. A force of inspectors and sanitary police are detailed to see that the material is collected and transported in an inoffensive manner. Some of the policemen are furnished with bicycles, so that they may patrol the streets and enforce the regulations. As a result this work is carried on with little disturbance or annoyance to anyone.

Many other varieties of nuisances might be mentioned, but I think I have cited enough to show the nature of the most serious, and our methods of dealing with them. In connection with the enforcement of our laws relating to the suppression of nuisances, I wish to mention the Health Squad detailed from the Police Department to the Department of Health. The work done by this squad includes the investigation and suppression of a great variety of nuisances. Many of the minor complaints and some of the more serious ones are handled by them. There is an immense moral force and an instinctive corrective influence in the sight of a uniform. Even when arrests are not deemed necessary the police are able to readily adjust, in an entirely amicable way, difficulties that might in other event prove more serious. Many nuisances are abated by personal effort on their part without resource to more vigorous measures.

We, in a large city, have shown that it is perfectly possible to reduce the annoyance from nuisances to a negligible quantity. In dealing with

this, as with every other question of a like magnitude, tolerance must be shown. A proper regard for the rights of all; a broad human understanding and a sense of justice are a trio of corrective influences which, when applied, may be relied upon to solve the problem and insure to each citizen the right to "life, liberty and the pursuit of happiness."

Note of Explanation.

It is a cause of deep regret that we are unable to publish Mr. Patterson's paper. It was sent to the wrong place and mislaid, the chairman of the Publication Committee did not receive it, and Mr. Patterson, unfortunately, did not have a copy of it. It was a most excellent paper, defining the scope of the Board of Health's power in abating nuisances. The effort to trace it and delay in receiving two reports have caused the delay in printing and issuing these Proceedings.

CHAIRMAN OF COMMITTEE.

THE PROGRESS OF SEWAGE DISPSOAL IN NEW JERSEY.

By Boyd MacLean, Esq., Jersey City, N. J.

In discussing the topic assigned to me, I feel that I should make it clear that it is not as Secretary of the State Sewerage Commission that I am stating the views which I will present, because in your program my official position is set forth. I am employed by the State Sewerage Commission, but I do not assume to speak for it. With your permission, I will discuss the progress of sewage disposal in New Jersey, as a member of this association, who presents only his own views.

In every line of scientific work, great progress has been made in recent years. So in the disposal of sewage most of our knowledge is of recent date. Though much still remains obscure, progress during the past ten years has been so great as to be revolutionary. This has produced cleanliness in communities, as increased knowledge in other lines produces cleanliness in individuals. The amount of progress in a community is commensurate with its intelligence. The progress of a community in dealing with the questions involved in the disposal of its wastes is perhaps as true an index of the civilization of its citizenship as is any test of sanitation or knowledge, the more so because the subject is intrinsically unattractive. For these reasons, it is with some pride that Jerseymen may look upon the progress made in sewage disposal in this State, as compared with any other community. By comparison, this State is clean, but it has not yet finished housecleaning.

In New Jersey, the disposal of sewage was a problem in cess-pools until half a century ago. Then the increase in population resulted in sewers leading to natural water courses. Probably Camden built sewers as early as any city in this State, commencing in 1857. At present, of 460 municipalities in the State, 335 remain unsewered, excepting for isolated drains. Of these 25 are actively progressing toward sewerage systems and a number more have the question in abeyance, Those not considering the question are farming communities. The remaining 135 municipalities have sewerage systems, 85 having systems regularly installed and 40 having private systems or systems for part of the territory. There are separate systems in 56 municipalities and 4 others have used separate sewers for recent work. Much of the population of New Jersey is suburban, consisting of people accustomed

to modern conveniences. They demand good water supplies, good plumbing and good sewerage. These advantages are thus spread to rural sections in a surprising degree.

Until the advance in sewage disposal dating from about 15 years ago, the discharge of sewage into streams was practically universal. Where populations became dense, results were disastrous, and the necessity of purification became apparent. During the years from 1892 to 1899, although purification of sewage was new and experimental, 9 purification plants were voluntarily installed in New Jersey of which seven are in present operation, one has been reconstructed and one abandoned for a trunk sewer outlet. The principal in New Jersey is the Passaic, by nature the sweetest water on the Atlantic coast. Crude sewage discharged from a dozen municipalities with populations grown dense has transformed its lower reach into a cesspool of vileness, with great destruction of life and property. From the resultant agitation came a new arm of state government, a State Sewerage Commission, created in 1899. This is the only State Sewerage Commission, although a temporary commission existed in Connecticut. Since the creation of this commission, seven years ago, the progress of sewage disposal in this State has been intimately associated with its work, and has been largely dependent upon its action. During that period the number of sewage disposal plants in the State has increased from nine to twenty-five, with fifteen in prospect and the possibility of half a dozen more being required as a result of pending investigations. Besides these large plants, probably half a hundred small plants for individual estates or houses have been installed.

Every modern method of treating sewage has been tried in New Jersey, with the possible exception of trickling filters, one of which has been advised. Most satisfactory results are obtained from broad irrigation and intermittent sand filtration. These require local conditions existing in few places. Elsewhere the septic tank has been used, either alone or in conjunction with various kinds of filtration, as conditions require. Its use has met with criticism elsewhere. In New Jersey it seems indispensable. There are eighteen tanks in the State not including individual house plants, with ten or fifteen more coming. The second septic tank on this continent is still doing good work at Overbrook.

The problems presented in the work of the sewerage commission are many and varied, but they may be roughly classified. They relate to interstate action for sanitation; the protection of water supplies; the protection of streams not used for water supplies; the protection of shell fish; and the protection of riparian owners. The interstate work varies only in that feature. The objects are similar to the other classes. The actions of the commission in this line are notable in that they constitute the first and, with one exception, the only interstate action for sanitary purposes. The first action was an agreement with Dr. Samuel G. Dixon, State Health Commissioner of Pennsylvania, that joint action should be taken for the protection of the Delaware

river. Dr. Eugene H. Porter, State Health Commissioner of New York, was consulted with and the result has been a tri-state understanding that no future pollution is to be permitted in the Delaware water-shed and that the present pollution is to be removed as soon as circumstances will permit. This involves the water supplies of several New Jersey municipalities, especially Trenton and Burlington, and also the valuable shell fish industries in South Jersey. For that reason action in New Jersey is being hastened, and north of Camden and on the tributaries of the Delaware the watershed in New Jersey will soon be clean in a sanitary sense. Dr. Dixon and Dr. Porter have made a similar agreement for the States of Pennsylvania and New York in regard to the Susquehanna watershed. This is the one other agreement between States for sanitary objects.

Another interstate question is under consideration in regard to the vicinity of New York. The Metropolitan Sewerage Commission of New York is charged with the duty of devising a plan for controlling the pollution of New York bay, a proposition which involves consideration of the disposal of the sewage of half the population of New Jersey. There is as yet no definite result from consideration of this matter, but the sewerage Commission is in consultation with the Metropolitan Commission in relation to it. It is improbable that any purification of the sewage of the main parts of New York City and Hudson county will be attempted. In the outlying districts, however, the prevention of additional pollution is feasible and proper. Many of the water supplies of this State are taken from streams having inhabitated watersheds. It is probable that the proper protection of all of such water supplies requires that they be filtered. The alternative would be the condemnation and devastation of the entire watershed, the cost of which is prohibitive. Usually there are large towns or cities in the watershed, some with sewerage systems, some with private drains, and some only furnishing pollution from street washings and overflows or seepage from privies.

Municipalities in watersheds are entitled to sewerage systems subject to the duty of maintaining the highest practicable degree of purification of sewage. One municipality cannot impound a district by simply using water flowing from or through it, so as to deprive owners of property in the district of the right to the normal use of their property. A city taking water from such a source does so at its peril, and if the district should be thickly populated, sanitary precautions of necessity will be imperfect. These questions arise at Vineland, Boonton, Dover, Newfoundland, Madison, Morristown, and in half of the Delaware river and Rahway river watersheds. Water supplies are entitled to every possible protection, it being a matter of life and death. It is difficult to impress the responsibility of their duty upon those who are in a position to kill or injure others. The theory of self-purification of streams may well be forgotten as far as New Jersey is concerned. There is no problem in the State where there is any probability of the elimination of in-

testinal bacteria between the source of pollution and the place of consumption. In some cases dilution is so great as to approximate elimination, but elimination cannot be insured. In most cases there is gross indifference, and even resentfulness against interference, extending in some cases to threats of the use of arms. Pollution has been wilful to force the purchase of property. This indifference to the lives and welfare of others is a discredit to the people involved. Fortunately, they are comparatively few, most of the citizens of the State assuming a more intelligent attitude.

The protection of streams not used for water supply is generally involved either in the protection of shell fish or of riparian owners. The shell fish industries of New Jersey produce annually more than three million dollars' worth of edible merchandise, the best of its kind. The protection of these industries is of great importance. Diseases are transmitted by infected shell fish. Of what has been termed residual typhoid, a large part is produced in this manner. Few of the shell-fish beds of New Jersey suffer from pollution. Usually they are in open water, away from residences, and so free from sewage. It is usual to freshen the shell fish by immersion in a fresh water stream before shipment to market. Here lies the danger. These streams usually drain populated districts and contain sewage pollution. The investigation of these questions has led to the requirement of sewage purification at Millville to protect the Maurice Cove shell fish, and probably will lead to similar action at Bridgeton and the entire Shrewsbury district. The sewerage commission is also experimenting in the sterilization of sewage for the purpose of safeguarding shell fish districts.

The owners of riparian property are entitled to protection against the deposit of filth along their shores. The use of waters for bathing, boating and other pleasure purposes is a property right and is entitled to protection. The ocean front, the summer resort district, and all of the rivers and creeks of New Jersey are concerned in this question. Continual action is being taken for the protection of these rights. The sewerage commission has repeatedly tried to impress on local authorities that its natural beauties are one of the chief assets of this State, "where every prospect pleases, and only man is vile." Where it had the power, the commission has enforced its advice, as at Red Bank and along the shores of the Navesink, Hackensack and Rahway rivers, and some of the creeks tributary to the Delaware river. This subject includes the chief problem in the State, that of the lower Passaic river, where the water supply problem was eliminated by typhoid. The sewerage commission was created to purify the Passaic. Every resident of the State knows that it must be purified. Yet to-day nothing has been done. This remarkable situation is worthy of particular notice.

In 1897, a commission having investigated the subject, recommended a trunk sewer from Paterson to Newark bay. This failed of adoption. In 1898 another commission made investigations and recommended the

creation of the State Sewerage Commission, with power to order the pollution to cease. Injunction was provided as a remedy for disobedience. This law was adopted, and the power was exercised. It soon became apparent that no action was being taken by the municipalities concerned in response to the order to cease pollution. In order to avoid the delay incident to allowing the time limit to expire before steps to compel action were taken, the commission requested from the Legislature the power to act, if the local authorities did not, to construct such sewers or works as might be necessary, and to assess the damages, much as municipalities treat property owners who neglect their sidewalks. This power the commission ought to have, but its request was sidetracked by another movement, and no progress has been made since. This new movement was the active agitation for purification by citizens of Newark. Sincere and almost violent in their efforts to obtain purification, their work was so misdirected that the only thing accomplished by their efforts has been the blocking of all steps to accomplish their desire.

At the time this agitation broke loose, either no legislation was needed to purify the Passaic or only such legislation was needed as would enforce the order of the commission. If other objects were desired, legislation might be necessary. Each of the towns concerned had been left to select its own remedy. If desired, two systems of united action were already provided by law, one by sewerage district and one by joint action successfully operated in parts of Union and Essex counties. If anyone desired to compel any town to act unwillingly in selecting a remedy, or if anyone desired to control the authority to build, including the expenditure of money and awarding of contracts, more law was needed. Under these conditions a law was drafted in Newark providing for the compelling of the adoption of a given remedy and for the control of the contracts and the expenditure of millions of dollars. Then the good people of Newark were misled into insisting on the passage of that bill to purify the Passaic. The bill became a law. Then the good people of Newark went down to the Passaic to observe the promised transfiguration. It did not happen. Then special sessions of the Legislature were called. More laws were enacted. More miracles were promised. Yet the river has become more filthy and yet more filthy. Of all the laws enacted at the request of the proponents of the Passaic valley district legislation, not one line has had or has now any effect on the Passaic river pollution excepting one clause which gives the district commission exclusive jurisdiction for the prevention of pollution in the district. This was designed to make absolute the control of the district commission over the expenditure of millions of dollars. Its only effect has been to suspend the enforcement of the order to cease pollution. To session after session of the Legislature the proponents of these measures have come with new acts, yet nothing has been added to the plans and ideas of the State commission. No new

plan has been proposed in the matter outside of its recommendations. Nothing is known of the subject matter which was not contained in its reports.

Again, a special session of the Legislature was proposed for the purpose of dealing with this problem. For four years the State Commission has been practically silent on the subject, since its superior, the Legislature, ignored its advice. It is of little moment who is granted power in this matter. The approval of plans in this as in other cases should be in the State Sewerage Commission. It is of great importance that to whomsoever power to act is granted it should be a proper power and that when that power has been properly exercised it should not again be revoked. The Legislature has power to restrain the State Commission from acting in the matter, as it has done. But the wisdom of still following the advice of those who have so often misled may be questioned.

Besides the ordinary questions of sewage disposal there is one kind of interference which affects this as other lines of progress, that furnished by the reactionist. His views are that purification plants are farces; that disposal is experimental; that rivers are natural sewers; that there is so much pollution that his addition is but a drop in a bucket; that purification is an expensive burden for the benefit of others who should pay the bill, or that the State should pay all or part of the bill because it imposes the duty; that it is better to conceal pollution than to remove it; and a hundred other falsities from a diseased brain. His mental attitude is similar to that of some residents of tenement sections who deposit their filth in the gutter, that being their idea of the extent of their duty and responsibility. It is difficult to convince such people that they must care for the nuisances they create. Fortunately most Jerseymen are enlightened and intelligent. This account for the vast progress already made in this State. Yet there are many of the other kind. It is peculiarly the duty of sanitarians to disseminate their information and knowledge for the creation of a healthy public opinion. The fulfillment of that duty will gradually eliminate the reactionist.

The Present Status of Sewage Disposal in the United States and Great Britain.

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To anyone reviewing superficially, and for a temporary purpose, the status of sewage disposal and purification to-day, this would appear to cover every known process, for it seems possible to conceive of conditions admitting of an economical adoption of any one of them all. An investigation, however, of the older works, where populations are increasing, shows that many are undergoing changes, their original design being altered to something more adaptable, or more economical; or probably the extent of the purification, carried out in the beginning, not being sufficient at the present time, new or additional processes have had to be added; all of which points to an evolution, which, in many cases, is leading to the adoption of one or more favored processes. I had the pleasure of accompanying Dr. Leal, your ex-president, and Dr. Curts, of Paterson, N. J., Chairman of the Joint Sewerage Commission of that city, while investigating processes of sewage disposal in America, with a view of determining the best system of disposal for that city; and also of accompanying Mr. Whipple, of New York, while investigating processes in Europe, as applying to the same problem, to all of whom I acknowledge great indebtedness, and the unfailing courtesy with which we were received everywhere will be remembered with pleasure.

In considering the purifying processes experimented with and their results, after visiting the experimental stations in Lawrence and Boston, Mass., and the many purification works in this country, and comparing them with the experiments and results as seen in the larger purification works in Europe, some similarity is found to exist, and this similarity is further noted in the later designs for the newer sewage works on both continents. Broad or surface irrigation and land or intermittent filtration, as purifying processes, are giving way in certain cases and for economical reasons to the more artificial filtering by contact beds and continuous filter beds, and of the two latter methods, that of continuous filters seems to be applied in the greater number of instances, but in all cases of comparison the stronger sewages to be dealt with in Europe, as compared with those in America, have to be taken into consideration.

From itineraries kindly arranged for by Dr. Leal, of Paterson, N. J.; Mr. Clark, of Lawrence, Mass.; Messrs. Hazen and Whipple, of New York, and Mr. Frye, of the Royal Commission on Sewage, of London,

England, it became possible to see in operation almost all systems of sewage disposal and purification, generally in use, as well as to meeet and converse with many of those whose names are more prominently identified with the subject.

It is necessary, in the consideration of the various processes for sewage purification, to have some method of arrangement or classification, for the purposes of references and a readier understanding of the subject. While investigating, there were seen three distinct phases of treatment—first, the preparatory; second, the actual filtering, or purifying phase, and third, a finishing treatment. The second phase or treatment is really the only one which it is necessary, particularly, to deal with in this paper, and will be considered mainly with the primary and tertiary phases as adjuncts. Of the various processes which make up this second phase may be mentioned disposal in salt and fresh water, broad or surface irrigation, land or intermittent filtration, contact beds and continuous filter beds. The preparatory processes seen were screening, grit or detritus tanks, chemical precipitation, septic tanks, sedimentation tanks and roughing filters, and the finishing processes were sedimentation tanks and continuous filtration through land or beds prepared for the purpose.

In general, it was found that mechanical screening or the removal of the larger matter in suspension, preceded all methods of disposal; grit or detritus tanks were used with filtration on land, or on the artificially-constructed filter beds; chemical precipitation was adopted in cases where a partial purification of the sewage only before discharge was all that was necessary, or where the nature of the sewage made it necessary to hasten the precipitation of the matter in suspension before the liquid passed to the filter beds; and sedimentation and septic tanks were used for the reduction and extraction of the suspended matter before final filtering.

DISPOSAL IN SALT WATER.

Of the solution of the problem by the discharge of raw sewage into large volumes of salt water, where the organic matter becomes disintegrated through the action of the bacteria in the water, and the inorganic matter, dispersed by the flow of tides, and tidal currents, until it finally settles, it might be said that this treatment appeared to be adopted in preference to any other, where it could be carried out without creating a nuisance, and with the same economy as by one or other of the filtering or preparatory processes.

As examples of the sea-disposal of raw sewage, and also the contemplated application of such disposal to-day, there is the metropolitan sewerage district of Boston, Mass., discharging into Boston harbor; the proposed discharge of the sewage of the lower Passaic valley, in New Jersey, into New York bay, as well as other large sewers in that neighborhood; the contemplated plan of discharging all the sewage of Liverpool, in England, into the Estuary of the Mersey, as well as that of

Edinburgh, in Scotland, into the Estuary of the Firth, where, in part, the sewage is subject in both cases to land treatment at present, and the change of the point of discharge for the sewage at Aberdeen, in Scotland, to a point at sea, more remote from the city, where the currents will act more favorably on its dispersion. These instances, among many, may be mentioned, showing that this method is preferably adopted where it can possibly be carried out. The discharge of raw sewage, however, in this manner in some instances, has affected the fisheries, both in this country and in Europe, as may be noted from subsequent litigation, but where this is the case it would appear that the purification of the sewage before discharge would be more a matter of local adjustment than an interference with the general principle of adoption.

Quite an exceptional case following the discharge of raw sewage into salt water is the nuisance produced at Belfast, in Ireland. For many years the sewage here has been retained in tanks, during the flow of the tide, and discharged only on ebb tide from a point at lowest tide-water. Annually, from June to November, large quantities of green sea-weed, or sea-lettuce, growing in the bay, are blown by winds on the shore of the bay, where, putrifying rapidly in warm weather, an intolerable stench is emitted, which is felt over a large area. Dr. Letts, of Queens University, in Belfast, after investigating the chemical changes undergone by this rotting weed, of which he found two varieties, concluded that its growth was due to the large volume of sewage in the bay, and to its power of absorbing ammonia and nitrates. That the evolution of sulphuretted hydrogen, when these weeds putrified by being crowded together, was the cause of the nuisance, and that the shallow portions of the bay and the rate of flow of the currents had an important bearing on the matter. Other bays were similarly affected where sewage was present, and the weed, on the whole, was a natural purifying agency for dealing with sewage in sea water, and that when blown on the fore shores of the bay the fermenting mass had all the characteristics of a concentrated and very foul sewage. After many experiments, he has reported in full on the matter, with the recommendation as to the purity of the effluent necessary for discharge to prevent further growth in future. Eighty acres of the bay have been reclaimed, and on this land is being erected a system of continuous filters, with rotary sprinklers, with septic tanks as a preparatory treatment for the sewage.

Owing to the condition of Dublin bay, also in Ireland, due to the discharge of raw sewage, it has been found necessary to adopt some purification before discharge in future, but there it is proposed to simply effect partial purification by the use of chemical precipitation. Notwithstanding these instances, however, where sea disposal has proved objectionable, it was found to be generally recommended as a method eliminating the annual cost of purification; for those communities so situated which might reasonably adopt it, duly taking into consideration the volume of water, the depth of the water at point of discharge, the ocean currents, and flow of the tide, as affecting its dispersion; and

where these were unsatisfactory, by the partial purification of the sewage, and the elimination of the grosser suspended matter, it was demonstrated that satisfactory results were obtained. Partial purification may not only reduce the nuisance from odor, but should prevent the formation of sludge deposits and the filling in of channels, etc. To the point of outfall or discharge in sea disposal, being imperfectly located, may be attributed much of the trouble accompanying this process, as might be seen at many places bordering on the ocean and disposing of their sewage in this manner.

DISPOSAL IN FRESH WATER.

As to the disposing of sewage in fresh-water rivers, lakes and streams, their self-purifying capacity, and the use to which the water is afterwards put, seems to determine, more or less, the feasibility of such a course. As has been stated in many papers on this subject, the American rivers are larger than those in England, and have been affected to a lesser extent in the past. It seems to be a question, however, where the water is used for drinking purposes, whether even purified effluents ought to be allowed to be discharged. The thorough discussion of this point in recent works and papers renders a reference to it here all that is necessary, and although it appears impossible to eliminate all disease germs from a sewage effluent, still rivers and lakes ought to have as much protection in this particular as is practically obtainable.

BROAD IRRIGATION.

Passing to the broad or surface irrigation method, or the flowing of sewage over land, where ærobic action affects that portion of the organic matter on the surface, and anærobic the part filtering into the land, notwithstanding the excellent results obtained in many instances, and the practical use to which certain sewages can be put in sewage farming, it was found that on account of the large area of land required for the purpose this treatment was being superceded by the more artificial methods of filtration. The nature of the land to which this process is applied determines, to a large degree, the economy of its adoption, for where sandy or porous soils are obtainable, the application of sewage was a benefit. Sewage in broad irrigation passes either directly after screening on the land, or otherwise the greater part of the matter in suspension is removed by some process of settlement. By the latter primary treatment, about three times as much liquid can be treated on a like area as by the former. It was noted that the land, by too frequent applications, has a tendency to become foul and emit odors, although in the beginning, and when fresh, this treatment may give every satisfaction. At Wakefield, in England, a chemically-precipitated liquid was seen applied in this manner, and the method practically demonstrated in many other places.

The use to which farmers may put raw sewage was further seen in the Blackburn district, in the same country, where they were permitted

to tap the main sewers leading through their land to purification works in the neighborhood for the purpose of irrigation. It was noted that excessive rainfall interfered with the successful adoption of this treatment, tending to a pollution of the streams, and generally speaking, as a method of disposing of the sewage of large communities, broad irrigation appeared a method of the past. Birmingham and Macclesfield, in England, might be mentioned, among other places, where continuous filtration is superceding this land treatment, although at Berlin, in Germany, where conditions are exceedingly favorable, about 16,000 acres of land are irrigated on this principle. At Paris, in France, where sewage farming is also extensively applied at present, the conditions are not quite so favorable for further extension, and it is intended in future to adopt some of the other filtration processes.

SAND OR INTERMITTENT FILTRATION.

Whenever land suitable for intermittent filtration can be found, in proximity, the purification of sewage by this process might be advantageously considered, owing to the favorable results obtainable. The filter beds necessary for this purpose are either formed on land naturally adapted for this purpose by the introduction of under-drainage, or are of more artificial construction, the coarser grains of sand being used; and in either case are of a depth proportionate to the type of sewage requiring to be treated and the nature of the land obtainable. By the filling and emptying of the filter beds from two to three times a day ærobic action is affected, and this by the suction of the air through the porous material in the process of emptying.

In the State of Massachusetts, at Worcester and other cities in the neighborhood, this method can be studied to great advantage, but, as in broad irrigation, the acreage necessary to deal with the sewage of large communities is prohibitive, and the porous soil required is not always obtainable. Data as to the amount of sewage which could be treated by intermittent filtration on various grades of soil were obtained at the Lawrence, Mass., experimental station, and this approximated 50,000 to 80,000 gallons of screened sewage per 24 hours per acre. At Worcester, the rate of flow through rough sand filters, five feet deep, with a chemically precipitated liquid, and also a liquid from which the heavier suspended matter had been settled, was found to be 100,000 to as much, at times, as 300,000 gallons per acre per 24 hours; and at Chorley, in England, similarly large amounts of chemically precipitated effluent were treated by sand filtration.

At Worcester, Mass., there were 27 acres of filtering beds, and additional beds were under construction at this time, and the purification of the effluent, before discharged into the Blackstone river, was 80 to 90%. There, with a view to determining a purification system requiring a lesser area of land, contact beds were being experimented with, dealing with septic tank liquids. The large amount of sewage at Worcester, averaging 12,000,000 gallons per 24 hours, to be dealt with on the above area of 27 acres, necessitated a portion of this

amount being discharged after chemical precipitation without filtration; and the excessive work given these beds, coupled with the suspended matter carried through the tanks, necessitated the raking of the beds frequently. Where sufficient area of land, however, can be obtained, the actual capacity of which for dealing with a particular sewage ascertained, and the depth and area of the beds arranged for, the treatment of sewage by intermittent sand filtration seems to give the best possible results; but the suspended matter, it was found, should be reduced as much as possible before the liquid is passed to the filters, by all or any of the preparatory processes required by the nature of the sewage to be dealt with. The sewage disposal works at Saratoga, in New York State, might also be mentioned where this treatment is giving excellent results.

CONTACT BEDS.

While visiting the purification plant at Worcester, Mass., as stated, an experimental double-contact filter was investigated, dealing with septic tank liquid, and furthermore, it was found that this process would satisfactorily deal with 500,000 to 1,000,000 gallons of septic liquid per acre per 24 hours. The principle of filling and emptying, and the bacterial action, are similar to those in intermittent filtration; but the beds are formed of broken stone, broken brick, clinker, or slate laid in layers, with a sufficient space in the latter case for the liquid between them.

At Manchester, in England, there are at present 46 acres of primary contact beds, treating septic tank liquid at a rate of 700,000 to 1,000,000 gallons per acre per 24 hours. The effluent resulting from this single contact and discharging into the Manchester ship canal is found to be unsatisfactory, however, and secondary beds are proposed for immediate construction which will reduce the amount treated per acre to about 400,000 gallons per 24 hours. Here the primary beds are of clinker, three feet deep, and it is proposed to construct the secondary beds of a like material, but only two feet deep. An attempt to treat raw sewage has been made there and discontinued, owing to the clogging of the bed, and it seemed to be a question if a more clarified liquid would not have to be applied in future than that from septic tanks, on economical grounds. The contact beds had to be washed every five years, although after washing it was found they remained longer in operation and with a larger capacity. Filters, it was claimed, ought only to deal, if possible, with the matters in solution, and as septic liquid carried in its passage some suspended matter, it was thought that an additional number of sedimentation tanks might advantageously be arranged to receive this liquid for further settlement before it finally reached the filter beds, and that this would greatly prolong the life of the beds. The necessity for the washing of material before application to the beds, when originally constructed, was insisted on, in order to remove all the smaller particles clinging to this material. When the secondary beds are constructed at Manchester,

there will be in the neighborhood of 80 acres on which to deal with a dry flow of 34,000,000 gallons per 24 hours.

At Burnley, in England, where there is installed a double-contact system, these beds, when new, were found to treat 80 gallons per cubic yard, but after being in use for a time, their capacity was reduced to 56 gallons on an average. The construction of the secondary beds there were from the smaller sizes of clinker, one-eighth to one-half inch mesh, while the larger sizes were put in the primary beds.

At Leeds, in England, where contact beds had been experimented with, it had been found that they were uneconomical for that particular sewage on account of the frequent washing required; and in the proposed new purification plant for that city, estimated to cost along with land and intercepting sewer some $7,000,000.00, continuous filters had been arranged for, preceded by chemical precipitation. At present, chemical precipitation is the only form of purification applied there, and the effluent is very unsatisfactory, judging from the condition of the river receiving this discharge.

In general, it was found that the life of contact beds depended on the evenness of the material and its power to resist consolidation more than on the undigested matter carried in by the sewage; that their capacity decreased greatly by use; that efficiency did not depend particularly on having a very great depth of material, and that from one week to one month's time elapsed before new beds would give satisfactory work in producing an effluent. It appeared also from the criticism the contact system of purification received, that, generally speaking, it was not held in as great estimation as that of continuous filtration, on account of the smaller amount of sewage dealt with per acre as compared with the latter process, and on account of the expense of renewing and washing the beds, which had to be done on an average every five years. An examination was made of the triple contact system at Hampton, on Thames, near London, England, dealing with the liquid from the hydrolytic tank. These contact beds were filled and emptied from the bottom, which arrangement appeared to do away with the more frequent washing as compared with the top application of the sewage and discharging from the bottom. The resulting effluent there was excellent, but the quantity of the sewage dealt with was small.

There are many small plants in this country where this system is in vogue, but the only one investigated was that of Plainfield, N. J., where septic tank liquid is treated on contact filter beds at the rate of 1,000,000 gallons a day.

CONTINUOUS OR PERCOLATING FILTERS.

At the experimental plant of the Boston Institute of Technology there was seen in operation a sprinkling continuous filter, the bed of which was of broken stone, eight feet deep, of sizes one and a half to two inches, and on which was filtered septic tank liquid at the rate of 2,000,000 gallons per acre per 24 hours. Except in this particular instance, in this country, no other examples of continuous filtration

were investigated; although it has since been decided to construct the works at Columbus, Ohio, and at Baltimore, Maryland, in both cases with this as the purifying process.

In Europe it was found that the mechanical methods for the distribution of sewage on these beds were either rotary or reciprocating, but in the larger plants fixed piping, fitted with sprinklers, were in general use. The bacterial action is ærobic; and in the Riddle district of England the difference in purification of the liquid coming from the center and edges of the bed was being determined by experiment. The depth of beds required was ascertained by trial for any particular sewage; and at Leeds, for example, screened sewage of that city, without settlement, required a depth of 12 feet before a satisfactory effluent was discharged; that septic liquid there required beds nine to ten feet deep; and chemically precipitated liquid, beds five to six feet in depth.

While in England, however, and the places having adopted this method of disposal, are mentioned in the order in which they were visited, it was noted that almost all the newer sewage works were constructed for continuous filtration, and while it was unnecessary to change from the contact or any other system to improve an effluent, except for economical reasons, still few contact beds or other systems seem to be in course of construction or even contemplated, as compared with places where continuous filtration was adopted or proposed to be so. The first continuous filter seen in actual operation was at Salford, where six and a half acres of beds were in use, to which were being added one and a half acres, the latter being in process of construction. On these beds are treated 2,000,000 gallons per acre in 24 hours, and during a wet weather flow as much as 6,000,000 gallons per acre have been treated in 24 hours.

The preliminary processes were screening, chemical precipitation and roughing filters; these latter filters, however, at the time of investigation, did not work very successfully on account of the difficulty of washing them with the appliances at hand at the time; but Mr. Corbett, the borough engineer, has since informed me that by means of air blowing and upward washing he hopes to remedy this defect. The additional sludge, consequent on the use of chemicals, was considered no detriment on the whole, on account of the small cost of its removal to sea by sludge steamboats. The material used in these beds was clinker, and, having experimented with the sewage on various beds from three to eight feet in depth, it had been concluded that the latter gave the best results; although from economical reasons an effluent satisfactory enough for discharge was obtained from beds five feet in depth. These beds had been in operation six years without cleaning, although their surface required raking at times. The effluent discharged into the Manchester Ship Canal had 93 per cent. purification. Except the work of the roughing filters, used to further intercept the suspended matter in its passage from the precipitation tanks, the Sal-

ford plant appeared to give every satisfaction, and its cost and maintenance per capita, as compared with that of the Manchester works with contact beds, was apparently lower. The sewage was of the usual manufacturing character, and was distributed over the filters by fixed sprinklers. The mains to these sprinklers have recently been constructed above the beds, where, as formerly, they had been placed within the material in the bed, the latter with a view to prevent the liquid freezing in winter.

At Hyde, in this neighborhood, there is a continuous filter plant operated by rotary sprinklers treating septic tank liquid of 1,000,000 gallons per 24 hours. The sewage containing wool scourings, fat, etc. This sewage is first screened, passed to septic tanks, then to sprinkling filters, and finally to settling tanks two feet in depth, from which it is discharged into the River Thames. The odor from the septic tanks has been complained of, as houses had been built within three hundred yards of the plant; and it is a question whether it would not be advisable to return to chemical precipitation as a primary process, which process had been previously in use. The filter beds were of rough coke, were octagon in shape, and 63 feet in diameter; and the best results had been attained from this sewage by treating one and a half million gallons per acre in 24 hours. The cost of maintaining this plant was less with septic tanks than it had been with chemical precipitation; which there was a probability of returning to; but the chemically precipitated sludge was dealt with with less trouble than the septic sludge. The effluent discharged had 93 per cent. purification.

At Macclesfield, the process of sewage treatment had originally been broad irrigation, but this had been discarded, and, after experimenting with chemical precipitation, the present plant had been designed for continuous filters, with screening, grit and septic tanks as primary processes, and final filtering beds, through which the effluent was passed after leaving the continuous filter beds, and before ultimate discharge. The sewage was largely composed of dye stuffs. The filter-bed material was broken sandstone, as clinker had been found difficult to obtain in this district, and was more expensive. At Rochdale, the sewage was found to be principally mill waste, with a large proportion of woolen waste, and there can be seen at this plant, in operation, sprinkling continuous filters, contact beds, and broad irrigation, with primary processes of screening, chemical precipitation, roughing tanks and septic tanks. The continuous filter beds have been in use seven years without cleaning, were constructed of coke of sizes over one inch, were nine feet in depth, and had an area of 200 square yards to each bed. The amount of sewage treated per acre on these beds was 2,000,000 gallons per 24 hours. The intention at Rochdale is to ultimately dispense with broad irrigation and contact beds, and to use only continuous filtration. The sewage, on account of the fats, after passing the screening tank, is mixed with sulphuric acid and alumino-ferric, four grains of the former and six grains of the latter; but this acid is only added when

wool scourings are present in the sewage. There was very little domestic sewage treated, as the town is operated on the pail system.

Thirty years ago at Chester, in Wales, a chemical precipitation plant had been installed, which was in operation in part when visited. This, however, is being replaced by continuous filtration, with rotary sprinklers, with a primary treatment of grit and septic tanks. At Darwin, from land treatment in the beginning, a change had been made, and continuous filtration adopted. At Bradford, the strongest sewage experienced was met with, and this was being treated by chemical precipitation alone for the present. The precipitant was sulphuric acid, of which three tons was mixed with every million gallons of sewage. It might be said that the works here were simply capable of extracting and recovering the grease from the wool scouring contained in the sewage. A new purification plant, however, has been planned, the estimated cost of which is $5,000,000, with land and intercepting sewers included; and, to the above, chemical precipitation will be added, continuous filtration with sprinklers, and a final filtration through land, if found necessary. The dry weather flow was 15,000,000 gallons per 24 hours, and the effluent discharged at present is, after precipitation by the acid, four times as strong as ordinary manufacturing sewage. When experimented with on filter beds, only 50 gallons per square yard could be treated, or about one-quarter million gallons per acre per 24 hours. $30,000 had been received in 1905 for the oil recovered from this sewage, and the acid precipitant had cost in the same year $60,000. When the oil had been extracted, the pressed sludge sold as manure for $1.50 per ton, and was otherwise mixed with coal and used as fuel at the plant. Three-quarters of Bradford's sewage is trade wastes, and it was found that it could not be treated in septic tanks.

The largest works seen were in Birmingham, where the sewage had been treated for about fifty years, and where a departure is being made from land treatment on some 3,000 acres to continuous filtration, and of the necessary filter beds for the latter, 20 acres had been constructed and more were in process of construction. This was probably the most modern plant investigated abroad, as well as being the largest. The treatment which it is proposed to subject all the Birmingham sewage, which is of a strong manufacturing nature, with a dry weather flow of 22,000,000 gallons per day, will be screening, grit tanks, septic tanks, sedimentation tanks of the Dortmund or conical type, and these latter for the easier removal of settled solids; continuous filtration with fixed sprinkling, and lastly, sedimentation tanks, also of the Dortmund type.

It is proposed, also, to treat all storm water by continuous filtration. The filter beds are constructed of a hard rough stone, of cubical shape, systematically laid in layers, of sizes from one to six inches, and are seven feet in depth. About $6,000,000 had been spent on this plant exclusive of land.

From the aforementioned instances, and after interviewing authorities on the subject, whose opinions appeared to favor the effectiveness

of continuous filtration, as a process capable of producing satisfactory results on a lesser area than any of the other filtration processes, and from the large expenditures incurred by communities in its adoption, and from the fact that the strongest manufacturing sewages, as well as domestic, were being dealt with successfully, it would appear that where a high standard of purification is necessary, almost as favorable results might be obtained by continuous filtration as by the adoption of the land processes. In some of the older and smaller purification works abroad, screening and sedimentation tanks were followed by continuous filtration through broken granite chips, the tank liquid simply overflowing and passing through this medium before discharge; but the effluent was at times unsatisfactory, and this process did not seem to receive much consideration.

ELECTRICAL TREATMENT.

Of the treatment of sewage by electricity, an experimental plant was seen at the Massachusetts Institute of Technology. Further experimenting had been given up, however, as precipitation by electrolysis was all that was affected, and the precipitation, it was explained, could be more advantageously obtained with chemicals.

PREPARATORY PROCESSES.

Of the preparatory processes of mechanical screening and grit or detritus tanks, nothing requires to be said now except that they practically precede all methods of purification.

Of chemical precipitation, the largest quantity of sewage dealt with by this process alone was seen at London, in England, where, at the purification works at Barking and Crossness, over 200,000,000 gallons were treated per day. The precipitants used were lime and iron, four grains of the former and one grain of the latter per gallon of sewage. The general impression gained from investigating there was, that on account of the lack of finality, regarding known purification processes, it was safer to continue discharging a semi-purified effluent into the estuary of the Thames, where up to this time it had proved satisfactory; than to launch into some treatment, by no particularly demonstrated effective method of further purification, involving an enormous expense, until the effectiveness of such further treatment could be more firmly established.

Glasgow, in Scotland, has in three localities—Dalmarnock, Shieldhall and Dalmuir—also adopted chemical precipitation before discharging its sewage into the river Clyde, and has provided works for the ultimate treatment of 250,000,000 gallons per day. At present, at Dalmarnock, 16,000,000 gallons are discharged into fifty times that volume of tidal water; and at Shieldhall and Dalmuir, 96,000,000 gallons are together discharged into about thirty times this volume of tidal water. On the nature of the sewage discharged, seems to depend the volume of water necessary to deal with it effectively. On the Thames, this process

seemed to give admirable results, and the improvement in the state of the river Clyde in latter years renders it apparent that when the entire sewage in this district is treated, freedom from all further nuisance will probably be attained. At Dublin, Ireland, a chemical precipitation plant is at present being erected, to treat the Dublin sewage before discharge into the bay. In this country, the works at Providence, Rhode Island; Jamaica, Long Island, and those of many other communities show that where the ultimate disposal of raw sewage cannot be affected satisfactorily by the volume of water at hand, and without creating a nuisance, the partial purification of a sewage may permit of an unobjectionable discharge.

SEPTIC TANKS.

Septic tanks, so generally applied in England for the purpose of organic sludge reduction, and in which country sufficient time has elapsed to prove their effectiveness, with the result that their adoption is advocated in many of the newer plants, both in this country and abroad, would, as a preparatory treatment to filtration, almost appear a necessity. The chief objection to the use of these tanks appeared to be on account of the odor from the liquid after being applied to the filtering beds, and it seemed to be a question whether the small amount of sludge disposed of by septic or putrifactive action would compensate for the nuisance in a district caused by this odor.

From the diversity of opinion, however, which seemed to exist with regard to this nuisance, it was evident that the character of the sewage had somewhat to do with it, and where trade wastes were dealt with largely, in some instances less odor was noticeable. However, in many plants the chemical precipitation of suspended matter was being resorted to; and also the settling of this matter in a series of sedimentation tanks, through which the sewage was passed as rapidly as possible, to reduce septic action before discharging on the filter beds. Septic tanks had been constructed both with and without covers, but, except where very small amounts of sewage were dealt with, none but the open type of tank were seen, as it had been found that anærobic action is produced as favorably in one case as in the other, and the expense of the superstructure dispensed with. When it was possible for septic tanks to be located far enough from habitations, their application seemed invariably to be recommended.

SEDIMENTATION TANKS.

Of sedimentation tanks, used in place of septic tanks for the settlement of suspended matter, the latest type of tanks appeared to be of a conical shape for the easier removal of sludge; and this preparatory treatment was advocated on many occasions where chemicals were not required, and where septic action produced objectionable odors, particularly in populous districts.

ROUGHING FILTERS.

A few roughing filters, formed of gravel and stone, as a means of reducing the suspended matter in the liquid, passing from chemical precipitation tanks, sedimentation tanks, or septic tanks, before reaching the filter beds, were seen in operation, and necessarily lead to a longer effective period for these filter beds.

STORM WATER.

The provision made in the design of any purification plant for the treatment of storm water, was usually found to be as follows: Tanks were arranged as a primary process for the reception of three times a dry weather flow; filter beds were prepared for six times the dry weather flow; but where the amount of liquid to be treated exceeded this, the excess was discharged at the outfall without purification.

STANDARDS.

No fixed standards for the purification of effluents seemed to be settled, either in this country or in Europe, except that in the majority of cases they required to be non-putrescent before being discharged, although in some districts in England, a test by the amount of oxygen absorbed in four hours in grains per gallon was applied, all effluents under one grain being passed as satisfactory.

SLUDGE DISPOSAL.

Of sludge disposal, it was noted that this depended to a great extent on its characteristics. Among some of the methods seen were the following: The spreading on land, the same land being used again after two years. The removal to sea by sludge steam boats. Again, after some process of pressing, its removal by farmers, and in some districts in England, the entire amount is thus disposed of. In every instance, however, this question appeared to be one of more or less perplexity, and also, one of the first importance when considering sewage purification.

GENERAL VIEWS.

During investigations abroad, some of the views expressed as to sewage purification were as follows:

Purification methods had not made any great advance in the last six years, and that owing to the variety of opinion existing on the latest methods, there appeared to be a lack of finality on the whole subject, with no particular recommendation as to any one process, and that every locality required to be treated according to the existing conditions, and that nuisances from odor were certainly occasioned.

CONTACT BEDS.

Regarding contact beds, some of the opinions were, that they got sick more quickly if one grade of material was used; that they should

be constructed with a finer material at the top, and the larger at the bottom; that clarified liquid had to be applied to these beds; that septic tank liquid could not be applied economically; that they were not as practical as continuous filters; that half a million gallons of liquid per acre was the limit that could be treated—more gave a bad effluent; and that of stone, clinker and broken brick, the latter gave the better results on the bed.

CONTINUOUS OR PERCOLATING FILTERS.

Of continuous or percolating filters, it was said—that coke of three-inch sizes was best, and that all of one size; again, that clinker was best and stone too smooth as the liquid passed through too rapidly, and that as to size, a mixture of a half and two inches, and one-half and three inches was best; that the worse the liquid the deeper the beds had to be; that these filters would not generally speaking, remove all suspended matter, and further settlement was necessary; that there was a difference in the nature of the purification at the center and edges of the beds; that sufficient ventilation from the bottom was very necessary, and that this process was superceding that of contact beds. Moreover, the lesser area required for this process, reduced the nuisance from odor proportionately as compared with land and contact systems. The medium for the beds required to be of sufficient size, and arranged for the passage of suspended solids with the effluent. Fine material on the upper layers of these beds of one-eighth and one-quarter inches, sometimes gave excellent results with weaker sewages; but this seemed to be applied exceptionally. The size of material, depth of beds, and time of passage to effect purification, had to be determined by experiment for any particular case. In large particle-filters, the rate of flow might be two to four minutes, while with fine material, this rate might be twenty to thirty minutes through the filters. Aerobic action appeared to be best in the upper portions of the bed, and the deepening of beds in instances had not improved the effluent.

SEPTIC TANKS.

Of septic tanks, it was said—that after trial, they had not accomplished all that was originally expected of them; that where septic effluent was sprinkled houses would not be built within a quarter of a mile of the same; that when chemically precipitated liquid, liquid from sedimentation tanks, and septic liquid had been sprayed over a filter bed, the latter only created a nuisance from odor, and the only way to prevent this nuisance was to give up septic treatment; that chemicals or sedimentation tanks were being substituted in some cases for septic treatment; that trade wastes on the whole reduced the smell from septic effluents and did not interfere with septic action; that the septic tank was fallacious in principle, as it got rid of oxygen in a tank which had to be restored again on filter beds; that after trial of a particular sewage in sedimentation and in septic tanks, the amount of

resulting sludge was practically the same in both cases; that chemicals were required in populous districts, and it was only a question of time in such districts, when septic tanks would be dispensed with and chemicals substituted. Septic tanks required cleaning, and therefore did not dispose of all the sludge, and moreover, the settlement tanks, after a septic effluent had passed through a filter bed, required cleaning also once a month or so.

It can be seen, however, in spite of these objections, that not only are the later plants in this country at Columbus, Ohio, and Baltimore, Maryland, designed with septic treatment; but the larger plants in England, such as Birmingham and Manchester had been constructed on this principle and this primary treatment was considered the most favorable for their conditions; and there did not appear, in the latter instances, to be the slightest intention of making any change. Moreover, it was said, the anærobic action in these tanks produces the disintegration of organic suspending matter more quickly than ærobic treatment; although, when dealing with matter in solution, ærobic action is held to be more effective; and the two agencies could thus be satisfactorily applied in any sewage purification system.

TRADE WASTES.

Regarding trade wastes, the opinions were that it was better for a community to undergo any extra expense and treat this along with the domestic sewage, than insist upon private purification, arranging generally, however, that the solids should be first eliminated before discharging these wastes into the sewers. Manufacturers in some districts paid so much per thousand gallons, depending upon the expense of the purification necessary to have their waste treated along with the domestic sewage; and in other districts not over 15 grains per gallon of solid matter was allowed to be discharged. Dye, tanning and brewing liquids required practically no previous treatment; but wastes from wool and skin processes had to have some treatment before discharging in the sewers.

Brewing wastes increased septic nuisances from smell; and so much difficulty had been experienced in the treatment of manufacturing wastes in general, that chemical precipitation, as a primary process at purification works, was recommended as a safeguard, and as more liable to satisfactorily deal with a sewage containing varieties of trade wastes. On the whole, to arrange the phases of purification of sewage in any order systematically, therefore, seems an impossibility, as each community may find one method superior to all others, due to local conditions. In recommending communities, therefore, about to adopt sewage purification, of the necessity of much preliminary investigation and experimental work, to determine the characteristics of the sewage to be treated and the methods to be adopted, is only repeating what has been said before; but experience proved that this advice had not always been taken.

The present paper might have been of greater use had it treated more technically of the mechanical, chemical and bacteriological principles involved, but this required a longer time for the study of the subject, and was entirely apart from the object in view.

Quacks and Quackeries and Their Nefarious Influence on the Lives of Tuberculosis Patients.

By S. A. Knopf, M.D., New York.

Associate Director of the Clinic for Pulmonary Diseases of the Health Department; Visiting Physician to the Riverside Sanatorium for Consumptives of the City of New York; Consulting Physician to the Sanatoria at Gabriels, N. Y., Scranton, Pa., Binghampton, N. Y., etc.

Those of us who have been fortunate enough to be able to study closely, not only the physical but also the mental and psychical condition of the consumptive will understand why he, more than any other kind of patient, becomes so readily a prey to the quack, to the patent medicine habit, to the mysterious healer, and why he is so often ready to change his doctor. The consumptive may feel well one day and by reason of some little imprudence in diet or exercise, some injudicious mental occupation or excitement seemingly so trifling that he may not recall it, will feel badly the next day and perhaps the following two or three days and, as a result, may lose confidence in his doctor, particularly if his own imprudent acts are repeated and result in a serious indisposition or complication. Then the patient may be ready to change his doctor of the regular school for a homeopath, or he will go to an eclectic, or an osteopath, an electropath, a vitopath, a naturopath, a Christian scientist, a magnetic healer or what not. He is perhaps the more ready to do this because one of his fellow sufferers has told him that ever since he stopped taking Dr. A's old-fashioned medicine and used Dr. B.'s homeopathic pills, or Dr. C's delicious eclectic mixtures, or had his curved spine straightened and dislocated vertebra and rib put back in their proper places, or been regularly subjected to a number of electric shocks, or been shown how to use the vitalizing ethers by the vitopath or walked barefooted in the dewy grass as

directed by the naturopath, had a few sittings with the Christian scientists who had convinced him that his disease was a delusion, or had the magnetic healer lay hands upon him, he felt so much better. The fellow sufferer who tried one of these methods successfully now considers it his duty to tell others of his wonderful betterment or quick recovery. Or the suggestion for a change from his regular medical attendant may come from a newspaper advertisement.

My good friend Mr. Samuel Hopkins Adams, that fearless pioneer in the movement against quackery in this country, divides the advertised cures, treatment, etc., into those which merely seek to cheat the victim out of his money by the bald pretense of aid; and those which act upon him by some drug stimulus, usually of a character demanding steadily increasing dosage, with correspondingly increased payment. Mr. Adams in his own inimitable way describes the first class of practitioners such as the Koch imitators, free X-ray examiners, Violet ray specialists, Vaporizing or Inhalant specialists, Phospho-psychopaths, etc., as swindlers first and murderers second. The second class are the patent medicine manufactures or sellers, who advertise sure consumption cures which contain morphine, chloral hydrate, cocaine, and nearly always alcohol in abundance and of an inferior kind. This class of quacks, that is to say who, under the name of a sure consumption cure, advertise and sell dangerous narcotics and alcohol and thus poison their victims, Mr. Adams calls murders first and swindlers second.

It is not my purpose in this short paper intended for both physicians and laymen alike to dwell at length upon the countless frauds, which are advertised in the daily papers and periodicals, not excluding even the religious papers, nor can I enumerate here the list of all the patent medicines in the market which claim to cure tuberculosis, asthma, bronchitis, coughs and colds. My much regretted friend, the late Dr. S. W. Abbott, has left behind him a lasting monument by giving us a list of about a hundred advertised patent medicines containing from 5 to 47.5% of alcohol. The list was reproduced by Mr. Bok in the *Ladies Home Journal* and by Mr. Adams in *Collier's Weekly*. Being somewhat apprehensive as to its accuracy, I wrote to Dr. Abbott to send me the list himself. He did so, with some correction and I published it in my paper, "The Family Physician as a factor in the Solution of the Tuberculosis Problem," read at the last Atlantic City meeting of the American Medical Association.* I must refer those of you who wish to study this list in detail to the publications just mentioned and particularly to Mr. Adams' exposé, "The Great American Fraud."

At the last meeting of the American Medical Association in Boston, L. F. Kebler, Ph.C., M.D., Chief of Drug Laboratory, Bureau of Chemistry, U. S. Department of Agriculture spoke to us in a highly instructive way on "Nostrums and Fraudulent Methods of Exploitation."†

* Journal of American Medical Association, October 22, 1904.

† Journal of American Medical Association, November 10, 1906.

Of consumption cures which he had investigated were the "East India Consumption Cure," "Lung Germine," "Plasters as positive cure for consumption," and "Tuberculozyne." Among the substances in the advertised formula of the "East India Consumption Cure" are the following: Asiatic Halish Sativa, Diosmæ and Cashgar. These are totally unknown to pharmacy, and as a result the prescription can only be put up by the advertisers to whom the patient is asked to send the money first. In reality the drugs contained in this so-called consumption cure are: Cinchona bark powdered, rochelle salts, ipecac and morphine. Judiciously used by the skilled physician these drugs may help in the symptomatic treatment; but none of them singly or in combination will cure consumption.

"Lung Germine" was found to be simply a hydro-alcoholic solution. containing 0.72 per cent. of ferric sulphate, 1.11 per cent. of magnesium sulphate, 0.03 per cent. of manganese sulphate and 9.08 per cent. of free sulphuric acid. Lung Germine is advertised as a positive cure for consumption and, as usual, an immediate and direct action on the germs of the disease is claimed. This statement, of course, is absurd. The "Plasters as a positive cure for consumption," put on the market by a company located in Camden, Mich., differ little in composition from the ordinary plasters manufactured by various wholesale druggists and used for relief of temporary local pain. Yet it is represented that with these plasters not only can one cure consumption, but "Lung Complaint, and all Bronchial Troubles, Kidney Diseases, Heart Diseases, Liver Complaint, Dropsy, Female Weakness, Sore and Weak Eyes." Dr. Kebler is putting it very mildly when he says, "It is the height of folly for any individual to claim that a simple plaster will cure the diseases contained under the above headings." I would put it, as the height of criminality to make such statements and an insult to the intelligence of an American citizen to be asked to believe such stuff.

"Tuberculozyne" is another consumptive cure investigated by Dr. Kebler. The remedy is placed on the market by a firm located at Kalamazoo, Mich., which makes the modest claim to be able to cure only consumption. Here is what Dr. Kebler has to say about this consumption cure. "Two liquid preparations are employed, one colored amber with caramel, and another red with aniline dye. The chief active constituents of the red medicine are alcohol and phosphatic material. Those of the amber colored preparation are alcohol and a small quantity of an organic copper salt. It is also claimed by the firm to contain heroin. The presence of this, however, could not be established, and even if present, it certainly does not possess a curative effect for consumption."

In an admirable paper, "Quackery and Tuberculosis," read a few weeks ago before the conference of Sanitary officers of the State of New York, Mr. Adams exposed anew a number of the most widely used and at the same time most dangerous remedies advertised to be a sure cure or infallible means to prevent consumption. With a kind-

ness, and for which I am deeply grateful, Mr. Adams has placed his MS. at my disposal. Listen to what he has to say of some of these remedies:

"I will venture the statement that every vendor of the alcohol class and of the opium class of "Consumption cures" is a self-confessed swindler. Put them to the question direct, ask him really what he thinks of his 'cure,' and he will squirm and dodge. A. C. Meyers & Co., of Baltimore, who make the morphine dose known as Dr. Bull's Cough Syrup, wrote me privately, 'We do not claim that Dr. Bull's Cough Syrup will cure an established case of consumption. If you have gotten that impression, you most likely have misunderstood what we claim.' It may be so; to err is human; yet it is difficult to find any basis for misunderstanding in the specific statement of Dr. Bull's advertising 'That there is *no* case of asthma, bronchitis *or consumption that cannot* be cured speedily by the proper use of Dr. Bull's Cough Syrup.'

"Similarly, Mr. Green, owner of Boschee's German Syrup, another consumption cure, informed me by letter, modestly enough, that some cases of consumption are beyond cure. On Mr. Green's sample bottle I find that his so-called remedy is a certain cure for *all* diseases of the throat and lungs. There is a general impression abroad that consumption is quite commonly a disease of the lungs and occasionally of the throat; therefore, Mr. Green's advertising department and his correspondence department seem to exhibit a lamentable lack of team-play, as it were. His so-called 'remedy' depends for its virtue on morphine and hydrocyanic acid. Dr. King's new discovery for consumption, which 'strikes terror to the doctors,' according to its advertisements, is in this same category; its morphine is mixed with chloroform and also alcohol.

"Chloroform and prussic acid enter into the composition of Shiloh Consumption Cure. Piso's Consumption Cure contains chloroform and cannabis indica. Peruna, which is mostly alcohol, with some cathartic added under pressure by the International Revenue authorities, is advertised to cure consumption. So is Duffy's Malt Whiskey, that hoary and disreputable fake in which half of the 'leading citizens' of Rochester own stock, for it is only a branch of the New York and Kentucky Distilling Company. Warner's Safe Cure belongs to this estimable outfit also, and is the drainage system whereby the company gets rid of its lowest grade of 'booze' at a profit. Paine's Celery Compound and Green's Nervura are also other jag medicines which make a profit from tuberculosis. Of the less baneful swindles may be mentioned Liquozone, that marvel of sulphuric acid, water and superheated air; Bioplasm; Pierce's Golden Medical Discovery; Ozomulsion, and Pink Pills for Pale People, this last and interesting compound of ferrous sulphate, starch and sugar, whose range of advertised usefulness extends from humpback to cold feet, with a suggestion of abortion-producing qualities to catch any incidental profit in that line of trade."

What lesson is not taught by this grim humor of Mr. Adams? Should it not be a warning to every mother using soothing syrup for her baby,* to every consumptive anxious to try the advertised sure consumptive cures, nay, to every man and woman, ill or well, never to try nor to recommend patent medicine of any kind, and never to use whiskey except when especially prescribed by a physician. That opium, chloral, cocaine or chloroform mixtures cannot cure consumption everybody should know. By their narcotic action they lull the patient into the belief that he feels better, but soon he must increase the dose to get any effect, and before long he becomes an opium or chloral fiend. In the meantime, truly curative measures, fresh air, good food, rest, etc., have been neglected. And what about whiskey? Does it do any good. On the contrary, intemperance and alcoholism predisposes to consumption. Whiskey has never prevented tuberculosis nor has it ever cured it. But when taken to excess and injudiciously it has always retarded improvement or cure. The belief that whiskey is a substitute for food is the greatest mistake a consumptive can make. How many a time in the families of the poor have I seen wife and children go hungry because the consumptive father needed all the money for whiskey to take for his disease, which some neighbor knew had been cured by this infallible remedy in somebody else's family. And then father always felt so good after taking it. Had that money been spent in milk, eggs, bread and meat, not only might the father have gotten well, but wife and children would not have had to starve.

Mr. Adams has paid his respects to the manufacturers, sellers and advertisers of patent medicines. The other day he also accused some very reputable drug manufacturers of being in league with the patent medicine vendor. He quoted two firms which manufacture the miserable stuff the patent medicine vendor advertises as his own product. These manufacturers have gone unpunished so far, but Mr. Adams suggests that the regular profession should make ethical firms understand that unless they cease to supply preparations for men like "Prof. Adkin of Rochester," and stop manufacturing "Radiozone" and the like, the American Medical Profession will refrain from using any of their legitimate products.

It remains for me now, as the final chapter of this sad subject, to speak of the most deplorable feature of all. I refer to the men who call themselves doctors, and who are often regular graduates of reputable schools, duly licensed practitioners, and signing M.D., which means *Doctor medicinæ*, or, in English, doctor of medicine, but in their

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* The following headlines from the "New York Herald" of October 31st, 1906, give a sample of by no means infrequent newspaper items, showing the danger which lurks in so-called soothing medicines for babies: "Say Opium Syrup killed the baby—Deadly drug said to have formed one-third of the contents of the 'Teething' Compound. After administering ten drops, in accordance with directions, she became peaceful—fell asleep, didn't awake. Mr. and Mrs. John Lane, of Williamsburg, sent for the physician too late to save three-weeks old child."

cases should be interpreted "menial of the devil," or, better yet, "meanest of devils," or if it must be in Latin, let us invent the name "Mephistopheles Diabolicus." Pardon me for benig so bitter, but had you seen what I have seen and witnessed the heartlessness and cruelty, the fiendish selfishness of these hyenas in human form, you would understand my feelings.

For a number of months a regular graduate and licensed physician in New York advertised the Finsen-ray treatment as a cure for consumption. The Finsen Light in the hands of honest men has done some good in skin tuberculosis. Its efficiency in pulmonary diseases is not yet demonstrated, and the above-mentioned physician, who advertises under the name of "Cabinaro institute," will never find out whether the Finsen rays do any good or not. A representative of our Board of Health, who went there to investigate, saw in place of the Finsen apparatus, ordinary electric light passed through blue glass. The poor patients pay dearly for the treatment. It does not do them a particle of good, and they lose valuable time by neglecting proper hygienic and dietetic treatment. To beguile the public this man, who took the Hypocratic oath to do right and justly toward his fellow physicians and patients, uses the sainted name of Finsen, one of the noblest men and benefactors who ever lived, as a means to betray and cheat his fellowmen out of their ofttime hard-earned money, and, what is still more valuable, out of their chances of getting well.

My colleague, Dr. John S. Billings, Jr., with whom I have the pleasure of being associated in our clinic for pulmonary diseases of the Health Department, recently caused the investigation of a certain Dr. Fose, of Brooklyn, whose system consisted of applying caustic plasters to the chest of the patient, corrosive enough to produce suppurating ulcers. The investigators found several patients in a shocking condition, with deep ulcers on their chests. These patients had sound lungs. but were declared consumptive by the doctor who instituted this barbarous treatment, making the patient believe that all the tuberculous disease of the lung was evacuated through the festering sore. To show how conscientious these men are in their diagnosis, let me detail to you the experience of two of our young men of the Health Department, who went to Dr. Fose to be examined. Both men are slender, but have perfectly sound lungs. Mr. T., who went there first, was told to remove his clothing in order to be examined. Before he had taken off his coat Dr. Fose informed him that the upper portion of both lungs were affected. The examination that followed was correspondingly superficial, but confirming the diagnosis which was made at sight. The second young man's examination was similar to that of Mr. T's. He, too, was told that he had consumption, but that he could be saved by the daily treatment of plasters and with weekly fees of $14.00. Dr. Billings had assured me that he had seen some of these ulcers so deep so as to expose the ribs. Can anyone conceive of anything more criminal than such practice?

Yet, after such occurrences, one need not be surprised at what we read in the confession of a reformed quack, such as appeared in the Cleveland *News* of October 22, 1906,* a newspaper in which another brave layman, Mr. Charles F. Steward, vigorously attacks quacks and quackeries. Here are a few essential axioms of the business of the quack, as confessed by a reformed charlatan:

"Get the money. Get it all. Everybody and anybody is in bad physical condition on the first visit to your office. At a time it is wise to cure a person on one visit, but never fail to find another of serious nature before establishing the cure of the first. Bleed the sucker until he dies, or until he will absolutely no longer be coerced into your office. Learn as soon as possible how much "cash" the sucker has and in what capacity he earns a living, or, in a word, how much he can afford to pay. Then multiply this amount by two. Always let the light shine full on the face of the patient and keep your own in the shadow, and while so situated paint graphically the horrors of the various ailments with which you tell him he is afflicted. Get the fee for professional services all cash, or as soon as possible, and then soak it to him for the medicine. Don't be afraid to say that you can cure anything and everything and give a 'legal' guarantee for the same. Lastly, never bring your heart to the office with you. The heart is not a money-getter."

But listen to the means some men resort to in order to get their grasp on the unfortunate sufferers from consumption. Nearly every day, but particularly on Sunday, you can see in several of the New York daily papers a glaring advertisement in praise of a successful treatment of throat and lung diseases, which places a certain Dr. Anderson foremost among the American specialists. "With his wonderful Anderson X-Light he looks directly into the body and assures absolutely correct diagnosis, and with his original germicidal vapor inhalation treatment carries the healing remedies directly to the seat of the disease and kills the tubercular germ."

To my lay hearers I wish to say that the Anderson X-Light is nothing more than the X-rays discovered by the great German scientist, Professor Roentgen. While the conscientious physician, if he can have access to a Roentgen apparatus, will probably use the X-rays as a help in diagnosis, he would never rely on it as an exclusive means. As far as Dr. Anderson's original germicidal vapor inhalation is concerned, I am willing to take the responsibility of making the statement that there is no known germicide powerful enough to kill all the bacilli of a consumption without killing the patient also. To invite the unwary the advertisement states that examination and consultation are given without any charge, and cost of treatment is no higher than that of the family physician. If unable to call, you are requested to write for advice and ask for Dr. Anderson's new illustrated book. I sent for this book and here is the title: "The New X-Light Diagnosis and a Successful

* Reprinted in the *Journal of American Medical Ass'n,* Vol. XLVII, No. 19.

Treatment and Cure of Consumption, Bronchitis, Asthma, Catarrh. Originated and used by Perry Llewellyn Anderson, M.D., formerly Professor of Chest and Stomach Diseases of the New York Medical Council, College of Physicians and Surgeons. Consulting Specialist to the Hospital of the Scientific Treatment of Lung and Chest Diseases."

Thus far I have been unable to locate the college and the hospital referred to on the title page of this book. Inquiries at the office of the Registrar of the College of Physicians and Surgeons (Columbia University) showed that no person bearing the name of P. L. Anderson has ever held a chair in that school.

This Dr. Anderson modestly compares himself, in the introductory chapter of his book, to Dr. Lorenz, of Vienna, who was likewise severely criticised and ill-treated by jealous confreres, and to cap the climax, he publishes the official rules of the Board of Health regarding consumption, which would be praiseworthy were the object of including official municipal documents in a book full of misleading statements not evident.

What the doctor thinks of himself can be seen on page 58 of his book, where he summarizes thus: "Dr. Anderson cures hundreds of patients every year. Truly, he is the foremost lung specialist and the only X-Light specialist in this country." A still greater degree of modesty is manifested in one of his advertisements. The one which appeared a week ago in the New York *Evening Journal* (November 7. 1906), reads as follows: "Dr. Anderson, who is the inventor of the Anderson X-Light, is the only *X-Light Lung Specialist* in the *world*. He is the *first* and only doctor to discover consumption in time to prevent and cure it." The dubious statements and strange claims of this Dr. Anderson remind one of the advertisements of the "Koch Lung Cure Concern," which, though driven out of New York, flourishes now in a number of cities of the middle West. I have seen several patients who had passed through these so-called institutes and thus learned a good deal of their methods.

This unscrupulous concern resorts to absolute fraud to beguile the public by using the name of the great scientist and benefactor, Prof. Robert Koch, of Berlin, as though he were associated with them in their business and treatment. They advertise his picture besides that of an individual with a similar name, and head their advertisements as "Professor Robert Koch's cure." While the medical profession at large was aware of this evident fraud, the public did not seem to be, and in order to be able to give an official denial of any such connection I wrote to Prof. Robert Koch, of Berlin, Germany; the professor's answer was a lengthy one, and full of indignation, and I will only give you the substance of it. He says that the alleged "lung cure" of Dr. Edward Koch, or under whatever name this treatment may be presented to the American public, is a very base fraud, and that he, Geheimrath Professor Dr. Robert Koch has no relation whatsoever with Dr. Edward Koch, with any other individual who may be connected with this concern or with any of its methods of treatment,

neither has he ever had any relations with the same. He hopes that the Committee on the Prevention of Tuberculosis may be successful in putting an end to this base and fraudulent practice. This is to be particularly desired in the interest of many poor consumptives who have been deceived by the use of this name in connection with the so-called Koch's Consumption and Asthma Cure.

When finally with the aid of the County Medical Society and the exposé in the "New York Herald" and by Mr. Keating in "Physical Culture," the Koch swindlers had to depart from New York, I was so delighted that I sent another letter to Dr. Koch and copies of the "Herald" containing the exposé. He was then in Africa on a scientific expedition, and here is the translation of his reply:

"I received your favor of April 18th, and also a number of newspapers. To my great satisfaction I read that at last some people have arisen to stop those quacks from continuing their nefarious work. For my part, whenever opportunity offered itself, I have never neglected to declare that I have never had anything whatsoever to do with the so-called Koch Lung Cure, and that these concerns used my name for fraudulent purposes. I would have long since brought suit against these swindlers, but friends familiar with the conditions in America advised against it, saying that according to the law in the United States these impostors could not be prosecuted. I too begin to believe that the only rational way to deal with them is the one taken by your Committee on the Prevention of Tuberculosis. The public should be informed through the press of the outrageous manner in which these unscrupulous people cheat and fleece the unfortunate consumptives.

"Wishing you a complete success in your battle against these dangerous quacks, I remain, "R. KOCH."

This is the sentiment on quacks and quackeries and their nefarious influence on the lives of the tuberculous patient of Prof. Robert Koch, one of the greatest scientists and physicians of the age, and to whom mankind will be lastingly indebted for his discovery, through which we have learned the true origin of the tuberculous disease and its prevention. Thousands and thousands of persons have already been saved from contracting tuberculosis since Koch's discovery of the tubercle bacilli in the year 1882.

Now, in conclusion, let me tell you the sentiment of a minor soul on the subect of "Quackery and Quacks and their Nefarious Influence on the Lives of Tuberculous Patients." The incident which I am to relate will also show how unscrupulous these charlatans are in their method of procuring certificates of cure which they publish as baits to the unfortunate, help-seeking sufferer. The fiendishness with which these men proceed in order to get the desired documents is something which can hardly be believed. The unfortunate patient referred to was a poor woman sent to me by the employer of her husband who had only recently heard of the serious illness of his employee's wife. The patient was in the last stage of the disease, hardly able to walk. When I asked for the name of her former medical attendant, she

confessed that she had been treated for a number of weeks by the Koch Lung Cure concern, and now, her means being exhausted, she was made to understand that they would continue to treat her only on condition that she would give them a certified testimonial that she had been thoroughly cured of her disease, which had been pronounced an advanced and hopeless case of consumption by three prominent New York physicians. The poor sufferer had not derived any benefit whatsoever from the many months of costly treatment. With tears streaming down her pale and emaciated cheeks and with a voice enfeebled and already indicating the progress of the disease, but still ringing with indignation, she said to me, "Poor as I am, and as much as I desired and needed treatment, I could not and would not be a partner to so fraudulent a procedure. I would rather die now than have it on my conscience to have sworn to such a statement." She had told her husband of this infamous proposition the Koch concern had made to her. He in turn told his employer, and thus I had another glimpse of the dangerous and unscrupulous methods of consumption quacks. The poor woman has since passed on, and, let us hope, to the just reward for her noble qualities and for her high sense of duty toward her fellow-sufferers.

I will not lengthen this paper with relating similar experiences which I have had myself, or which have been told to me by my colleagues. There is a ray of hope. A number of religious and a few daily papers begin to refuse quack advertisements. Senators, Congressmen, clergymen of all denominations, sisters of charities and heads of educational institutions now think twice before they give certificates on the value of patent medicines. Yesterday evening upon the call of Mr. Champe S. Andrews, counsel for the Medical Society of New York County, a national society was formed which has for its object to combat adulteration of food and drugs; the sale of alcohol and opium in the guise of "patent" medicines; the practice of the quack and charlatan, both in and out of the medical profession; the use of the United States mails for fraudulent and indecent advertising, and other similar dangers to the public health and morals. We all hope that great good will result from this new movement.

Let me now, in conclusion, answer the question, How is tuberculosis cured if not cured by quacks, patent medicines or other secret means, nor by any specific remedy? For curable it is indeed.

It is cured solely and exclusively by the unstinted, yet judicious use of God's fresh pure air, sunshine, plenty of good pure water inside and outside, abundant plain but good food (milk, eggs, meat, vegetables, fruit), and the help of certain medicinal substances, when the just mentioned hygienic and dietetic means do not suffice in themselves to combat the disease, and all of this under the conscientious guidance of a competent physician. This may be done successfully in nearly all climates, and in the home of the patient, if conditions there are favorable. For the poorer classes of patients this hygienic and dietetic treatment can, of course, best be carried out in a special institution called a sana-

torium, and our municipalities and philanthropists could do much toward the cure of these unfortunates, by directing their efforts toward the establishment of such much need sanatoria.

If we could only bear this in mind and act accordingly; if only rich and poor, the well and the ill, would do their duty toward their fellowmen, we would master not only tuberculosis as a disease of the masses, but solve in a large measure the social problem of our time. If we remove the causes of tuberculosis such as bad housing, underfeeding, bad sanitation of workshops and factories, intemperance and unhygienic modes of living, we remove at the same time the causes of many social ills. And, if we replace unsanitary homes and factories by model ones, improve the social condition of the laboring classes, encourage rational temperances and a simple mode of living, we will prevent the spread of tuberculosis in countless instances without even being aware of it, prevent the development of the disease in thousands of individuals predisposed to tuberculosis and as a result of all we shall add directly and indirectly to the wealth, health and happiness of the nation.

Flood Control and Conservation of Water Applied to Passaic River.

BY MORRIS R. SHERRERD, C. E., NEWARK, N. J.

For many years the possibility of the conservation of the waters of the Passaic river, both for power and water-supply purposes, has been discussed and many reports have been made on the subject, particularly in connection with the Geological Survey of New Jersey, but it was not until the devastation which was occasioned by the recent disastrous floods on the Passaic river, namely, those of March, 1902, and October, 1903, made the question of flood control one of sufficient importance to warrant a thorough investigation of the possibility of such control, that the subject received as much attention as its importance deserved.

At the time, about two months ago, when the President of the Association requested a paper on this subject, it was promised in anticipation that the studies and investigations now under way by the Passaic River Flood District Commission would be compiled in the shape of a report under the recent legislation directing the Commission to proceed with the same.

The field work of the Commission is completed, and careful surveys to determine the cost of the construction of a dam at Mountain View, New Jersey, both on the basis of flood control and conservation of water, have been finished. The compilation of this data in satisfactory shape for presentation to the public is still in progress, and will require, perhaps, two weeks before it can be formulated into a report. Therefore, it would be somewhat premature to do more than give a general outline of what the possibilities are in connection with the subjects under investigation.

Any adequate plan for flood control on the Passaic River must of necessity provide sufficient storage to hold back and retard the flood discharge through the lower valley below Little Falls sufficiently that the amount of water, which is allowed to pass down the river, may safely be carried by a reasonable adjustment of the present restricted channel.

In the report of the Northern New Jersey Flood Commission submitted to the Legislature in March, 1904, this whole subject was thoroughly discussed, and the conclusion of the Commission was that while the construction of a reservoir with a dam at Mountain View of sufficient height for flood control purposes was estimated to cost $3,460,000, which would be considerably more than the cost of the construction of a retarding reservoir with a dam located at Little Falls (the difference being about $900,000), still the former location would lend itself so admirably to conservation purposes that it would be a much more satisfactory location, and eventually work out much more economically than the Little Falls plan.

During the three years' study devoted to this problem by the two commissions referred to, the membership being the same in each, the unanimous judgment of the commissioners is that nothing has developed to change the previously-expressed opinion on this subject. For purely flood-control purposes, either proposition is so expensive as to require serious consideration as to whether the benefits to be derived are sufficient to justify the necessary expenditure. Any combination or further development which would result in producing revenue tending to make the scheme self-sustaining becomes essential in the study of the problem; also, the wisdom of conserving the water-supply of the State for the use of its inhabitants is becoming from year to year more apparent, and while, perhaps, the immediate needs of the metropolitan district of New Jersey, embracing Newark, Jersey City, Paterson, Hoboken, the Oranges, Montclair, Elizabeth and the smaller communities adjacent thereto are not pressing, none of the territory is adequately provided for water-supply for more than twenty years, and some are already seeking additional potable water. On account of this situation, this district hardly feels justified in joining in present expenditures for conservation for which it has no present use, but the subject is one which should be considered in its broad sense as affecting the prosperity of the State. Certainly an adequate conservation plan, which will be able to supply the needs

of the several communities as they develop, could be much more economically carried out on broad lines, even if done at the joint expense of the communities themselves, than for each one to supply its own needs independently.

The conservation of water by the State under the present Constitution, unless such conservation can be made at once self-sustaining, would seem to be limited to the expenditure allowed by the Constitution of $100,000. There is, however, a provision in the Constitution which would allow the issuing of bonds for such work as the construction of a reservoir on the Passaic, provided the interest and sinking fund for such bonds are taken care of without pledging the State's revenues. Such a work, however, can only be constructed after a law for the same has been submitted and approved by a majority vote of the people of the entire State. This is shown by the following paragraph of the State Constitution:

"SECTION VI.

"4. The Legislature shall not in any manner create any debt or debts, liability or liabilities of the State, which shall singly or in the aggregate with any previous debts or liabilities at any time exceed one hundred thousand dollars, except for purposes of war, or to repel invasion, or to suppress insurrection, unless the same shall be authorized by a law for some single object or work to be distinctly specified therein; which law shall provide the ways and means, exclusive of loans, to pay the interest of such debt or liability as it falls due, and also to pay and discharge the principal of such debt or liability within thirty-five years from the time of the contracting thereof, and shall be irrepealable until such debt or liability, and the interest thereon, are fully paid and discharged, and no such law shall take effect until it shall, at a general election, have been submitted to the people and have received the sanction of a majority of all the votes cast for and against it at such election; and all money to be raised by the authority of such law shall be applied only to the specific object stated therein, and to the payment of the debt thereby created. This section shall not be construed to refer to any money that has been, or may be, deposited with this State by the Government of the United States."

Broadly stated, the development of a storage reservoir with a dam at Mountain View, which could be utilized by keeping the upper part of said reservoir for flood-control purposes, would cost in the neighborhood of $6,000,000. This cost includes land for reservoir, the construction of a dam, necessary changes of railroads and highways, and the re-location of the Newark pipe line and the Morris Canal, all based on careful estimates made up from actual surveys. This would provide storage in addition to flood control, but does not include any estimate for diversion rights of the mill owners below, but would provide sufficient storage to allow a uniform discharge in the river below the dam, which would more than compensate the mill owners

for any loss of power; so the damages in any event would be nominal. This would be on the principle of substitution or compensation for diversion, and while such a principle has not been established in New Jersey, it would seem to come within the scope of the State's power of eminent domain. In other words, while it would not now apply to individual diversion, it might be applied by legislation to diversion made by the State itself. In fact, such a substitution of increased flow in the river would be a benefit to the water powers below, which they might reasonably be required to pay for.

It might safely be said that nowhere within 50 miles, and possibly nowhere within 100 miles of New York City, can a large storage of potable water be obtained at so little cost per million gallons as would be the case from storage on Pompton Plains. The available storage by the Mountain View Dam from a drainage area of 380 square miles, reserving sufficient capacity in the reservoir for flood control, would still be in the neighborhood of 60,000,000,000 gallons. Comparing this with the Pequannock Supply for the City of Newark, the drainage area is about six times as great and the capacity slightly more than six times that of the storage reservoirs in the Pequannock Watershed. The yield from the Pequannock has been carefully measured, and with its present storage is sufficient for a yield of 50,000,000 gallons per day. If the same ratio of yield is applied to the Pompton Plains reservoir it will give a total yield of 300,000,000 gallons per day. The storage reservoir in the Pompton Plains scheme, being at the lower end of the watershed, would give a more complete development and a higher yield than is the case on the Pequannock. It is, therefore, safe to say that the yield at Mountain View, even with the diversion of the Pequannock, which is in the same watershed, would still be sufficient to give 280,000,000 gallons per day, and possibly as high as 300,000,000 gallons for the driest year. And if 80,000,000 gallons of this development were allowed to discharge down the Passaic river, which would be augmented by the natural flow of the waters of the West branch, the low flow of the Passaic at Little Falls and at the Great Falls would be increased above its present low flow, and there would still be left for sale or actual diversion from the Mountain View development 200,000,000 gallons of water per day, and if this could be obtained for the total cost of $6,000,000, the cost of obtaining the same would be $30,000 per million gallons for the Pompton Plains development, as against the cost of about $80,000 per million gallons for 50,000,000 gallon development on the Pequannock, which is considered to be an exceedingly reasonable cost. For the new supply for New York City this relative cost will be $200,000 per million gallons developed, and for the new supply for Jersey City it approximates $100,000 for its 50,000,000 gallon per day development.

The essential factor to make an immediate development or conservation of water on the Passaic river self-sustaining is to at once procure a customer for the water, which can be so cheaply stored. And since the cities of New Jersey in this vicinity are now supplied, but

since their needs will gradually increase, if a customer can at once be found outside of these cities, it would be essential that such customer should only be supplied for a limited time and at a decreasing quantity. These conditions are exactly met by the present situation in regard to New York City's water supply. On page 15 of the report by Mr. James H. Fuertes, C. E., to the Committee on Water-Supply of the Merchants' Association of New York will be found, among other conclusions, the following:

"With the greatest amount of waste and leak reduction possible of practical accomplishment during the coming years, and with the construction of the proposed Cross River Reservoir and all other emergency reservoirs that can be built in the Croton water-shed, the city will not be out of danger of a water famine until the new supply is made available. The construction of the first installment of the new works should therefore be started immediately and should be pushed to completion as rapidly as possible."

And it is also true, as shown in other reports on the water situation in New York City, that the present draft on their available reservoirs is now from 40,000,000 to 50,000,000 gallons per day above the maximum yield of their water-shed developments, based on recent dry years. This deficiency will rapidly increase, and unless stringent measures are resorted to to reduce the consumption, this rate of increase will approximate 10,000,000 gallons per day per year, so that at the end of five years the deficiency will be in the neighborhood of 100,000,000 gallons per day. It is also variously estimated that no additional water will be available from the new sources of supply for New York City in from six to ten years.

From the above it seems to be a fair deduction that New York City could reasonably afford to pay, as an insurance against a water famine, on a basis of say $25 per million gallons for an available supply of 100,000,000 gallons per day, which it might demand for immediate delivery. This would amount to over $900,000 per year, and upon a five per centum capitalization would seem to justify an expenditure of $18,000,000.

The reservoir will cost about $6,000,000 to be able to furnish 200,000,000 gallons per day from the same, and it would, of course, be necessary that some pipe line be constructed to deliver this temporary supply to New York City. This part of the suggested plan has not been worked out in detail, but may be roughly stated as possible of accomplishment for a further expenditure of $5,000,000 for pipe line, the route of which could be so selected as to make at least three-fourths of its length available for distribution within the New Jersey territory. The construction work in connection with the Pompton Plains scheme, is so simple that the works could be built in less than two years.

Summing up the above, would mean an expenditure of eleven million dollars to accomplish flood control and conservation of at least 200,000,000 gallons of potable water per day, for which it should be possible to obtain an immediate customer for 100 million gallons and an annual

revenue of $900,000, and as the needs of New York City would be supplied by its own works, the cities of New Jersey would become customers of the State. And as the prices received from this latter source would, of course, be much higher than that charged for an insurance supply, there would only be a few years intervening between the termination of contract with New York City and the time when the New Jersey cities would be returning an adequate income to pay the interest, sinking fund and cost of operation of the plant. By a proper financing of the scheme, it would seem to be susceptible of the creation of a surplus sinking fund during the early period, supplemented by the increasing earnings in the later period, which would adequately provide for the retirement of bonds issued for the first cost at the end of 35 years.

The above is presented for consideration, and with the expectation that some of its features will be more definitely worked out in the report of the Passaic River Flood District Commission, which will soon be issued. The writer desires to supplement the foregoing by endorsing the following quotation from a report presented to the Geological Survey of New Jersey by Mr. C. C. Vermeule, C. E., as follows:

"No proposition to divert water from the State, even temporarily, should be entertained unless the same can be done under the direct control of the State for such a limited time that it will not interfere with the requirements of the cities of New Jersey, and under such conditions that it will not impose a hardship upon the riparian owners along the stream."

While endorsing the above, we beg leave to differ with Mr. Vermeule's conclusion as to the relative availability of the Mountain View site as contrasted with the Little Falls site, which, in the writer's judgment, would be less adapted for storage of water for potable purposes.

SCHOOL ARCHITECTURE FROM A SANITARY STANDPOINT.

By Nathan Myers, Architect, Newark, N. J.

There is no class of municipal architecture that is more interesting, and none where each problem is more different in treatment than that of schools. Fortunately, it is that branch of public work that has also received the most scientific study and attention. That we may have proper schools from a sanitary standpoint, the first step to be considered is the selection of the site. If in any way possible, do not crowd your school in between other structures, with no outside play space, and be satisfied with the courts to assemble the students, and the necessary class-rooms for instruction, with the idea that exercise and fresh air can be had upon the streets and away from the schools. A healthy mind, and a healthy body are inseparable. The latter is necessary to retain and support the former. The modern educator understands this well, as is proven by the personal interest of the heads of the various schools in outdoor work.

Boston provides from 25 to 40 square feet of yard for each pupil the school is to enroll, according to the section of the city in which the property is located. New York, where she cannot provide playgrounds on the street level, often sends her children to the roofs, far above the unhealthy streets and dangerous thoroughfares, there to enjoy life as they cannot in the tenements. Thirty square feet per pupil is the English standard, and is the average allowed in those cities in our country that have given this important question serious consideration. Not only should the site be large enough for the proposed buildings and playgrounds, but it should be selected on high ground, where the natural drainage is good, avoiding any possible low, swampy or hollow sections, and with a view to pleasant scenes from all sides. The surroundings should instil a desire in those attending to be ever about their place of work in a good spirit.

Seldom do we find a school better situated than the Newark High School, facing Branch Brook Park, with its sloping grounds, pretty walks and large lake, the latter inviting the pupils to its rowing in summer and skating in winter. True, it has been adversely criticised for being somewhat out of the way for the mass of the people, but the disadvantages are outweighed by what health and inspiration everyone receives. In this respect, the foresight which Ezra Cornell showed

forty years ago is hardly equalled. He, desiring to found an institution of learing "wherein any student might find instruction in any subject," looked well before he leaped, and finally settled upon the hills of Cayuga Lake, four hundred feet above the valley and the most magnificient of all lakes of the Empire State. With his handful of instructors and students, he did not provide a small parcel of ground, but from Cascadilla Gorge at the south, to Fall Creek Gorge at the north, from the Ithaca valley, to the far distant eastern fields, did he secure thousand of acres, but none too much is there now, for nearly four thousand students in attendance.

France, Switzerland and England, have all made good progress in their school work, but, as in all matters relative to education, Germany has made a more scientific study of school planning, and as their system of education is similar to the American, that is, the division of classes into primary and secondary grades, we find their school-house more closely resembling ours. But, while we have learned from them many points of interest and benefited thereby, we have advanced beyond them in many other ways. We recognize, more so than the Germans, the importance of good ventilation, freedom from bad odors, and the separation of outer garments from the class room.

The German school-room is lighted either from one side or from two opposite sides, the teacher never facing the windows, and the pupils not subjected to cross light, since the principal light comes from the left-hand side. Where the room has windows on one side only, they advocate that the row of desks furthest from the light should not be greater than once and a half the height of the room. They do not strictly adhere to this rule, but, as in France, 21 to 22 feet is the customary width. They place the maximum length of the rooms at thirty feet, as the distance the average voice can throw with ease. As they allow but 10 to 12 square feet of floor surface per pupil, and we 12 to 16, and, according to our State law, should allow 18 square feet, it is easier for them to reduce the size of their rooms. We would be compelled to make the room 32 feet long, and reduce the number of our pupils to 40 per class-room. Our State law requires that the glass area of the windows shall equal 20 per cent. of the floor area of the room; New York City, in practice, places its minimum at 25 per cent. Where rooms are wider than 22 feet, and where the light is but from one side, it should surely equal that minimum. General class-rooms should always be lighted from the left, or left and rear, with the top of the sash 8 inches from the ceiling; the drawing-room should be lighted from one side and additional roof lights where possible, bearing in mind that north light is best for such work; the laboratories for the study of all sciences, and the shops of manual training departments should be flooded with light, from as many sides as possible. Assembly halls, now assuming the proportion of theatres, differ, in that they must have good natural daylight. Windows at the side and rear, and roof lights are advantageous.

The walls of the class-rooms should be plastered, which is most generally done. At Washington, the lower grade schools have the common brick walls exposed and tinted. This might be satisfactory, here, where there is danger of condensation of moisture, and where the external walls will cool the room too quickly at night. Rockefeller Hall, the new home of the College of Physics at Cornell University, has the entire inside of the walls laid up in hollow brick, and tinted. It is the only building on the campus finished in that manner, and how great a success it will be remains to be seen. Plaster ceilings are superior to the metal ceilings, and the latter should never be used, except when special occasion may require. Plaster on metal lath is more sanitary and more fire resisting. The walls of class-rooms should be decorated soon after the completion of the structure. The space below the chalk rail, oil painted, or better, covered with a finished crash, and the walls above finished in water-color or oil paint. The ceilings should be a light cream or ivory white, with the walls a soft shade of light green for those rooms having southern exposure, while light buff is good for the others. Class-room blackboards should always be of the best quality black or green slate, and be provided with chalk troughs covered with wire dust guards. The boards should be placed on two walls only. The space between windows ought never to be used, and that to the rear of the students is seldom used.

The Boston wardrobes are very satisfactory, their length being the width of the class-room. They have clothes hooks upon rods, so placed that the children's clothes hang free of one another. An umbrella holder is placed under the rods. Steam coils are run under the same, which help to dry the clothes in wet weather, and betters the circulation to the high vent registers. The practice of using the corridor for cloak-room is highly objectionable, as the movement of air in the buildings is naturally towards the school-rooms, to say nothing of the danger of disease. The mass of clothing, especially if wet, is one of the main causes of the offensive school-house odor.

As to the sanitaries, we find, following the common yard vault, that the brick latrines and ranges were soon replaced by individual tank flushed toilets provided in the building. In some buildings, the toilets have been distributed on the various floors, but this scheme increases the cost of plumbing, increases cubitage and, therefore, increases cost of building, except, of course, where the entire court or ground floor is otherwise more usefully occupied. In the undergrade schools, the children need the toilets more generally on the court floor, with perhaps only an emergency toilet on the upper stories. The flooring of toilet rooms does not generally receive proper attention. In teacher's and girls' rooms tile floor and base should be installed. Cement for these rooms is not so objectionable as in the boys' toilets, where it ought never to be used, especially near the urinals. Where urine comes in contact with the cement, the stain and odor can never be removed and the chemical action which follows, tends to retain the unpleasant

qualities of the former. In such places, a well laid slate or alberene stone floor drained to the waste outlet, so that the floor can be flushed, are good materials to use. They are non-absorbent and can be laid in large sheets avoiding the cement joints to a greater extent than in any other material.

Little attention has been given in New Jersey schools to bathing of pupils. New England cities have made much progress in this line. In three schools of Springfield, Mass., in one year 24,000 baths have been given; 11,000 in one school alone. The matron in charge has special care for the physical well being of the children, who report to her for baths from week to week. Bath tubs ought to be used with great precaution, and only for such children whose health may be too delicate to risk the possible shock of the shower. Where the institution is large enough and the appropriation permits, a swimming tank should be installed for instruction and practice, but no person ought to be allowed to the plunge without first having had a cleansing bath. It, indeed, would be difficult to estimate the beneficial effect of this branch of public school work. Sanitary drinking fountains are being installed to good advantage, thus obviating the use of the common drinking cups objectionable for many reasons. The gymnasium has always had its place in the university and college, and for some time has been part of the plan of the modern high school. Fortunately, many of our progressive communities are now providing similar advantages in the undergrade school. Modern European countries have for over a century made physical education an obligatory part of the school curriculum. In France, a series of exercises were adapted to a jingling rhyme and to music. Chanting governed the movements, marked the interval of repose and helped to strengthen the voice and respiration. America has been gradually awakening to the situation, and henceforth we may expect rapid strides for the better health of the student, and consequent better attendance and better mental results.

There is perhaps no subject upon which there is more divergence of opinion than that of heating and ventilating, and the so-called patent systems and special designs are innumerable, some with much merit, but usually about the same results may be obtained by a simpler system properly designed. The heating and ventilating of an institution must be treated as one proposition. The entire heat may be supplied with the ventilating air, or only a portion. Best results as to heating can be generally obtained by direct steam radiation, the amount provided being enough to produce a temperature of 70° Fahrenheit under all atmospheric conditions. If temperature regulation is not used, it is advisable to have the radiation divided into two sections in each room so half, or all, may be used according to the season of the year. The object of automatic temperature regulation is to maintain uniformly the temperature of the room; necessary, because the teacher or janitor, busied with other duties, cannot be as exact nor so prompt as automatic apparatus; beneficial because, maintaining the rooms at an even temperature, the health and comfort of the pupils are promoted.

Where the teacher is expected to regulate the temperature of a room, the heat will usually vary as her mental or physical condition varies. Often, when too warm, the windows are thrown open, disturbing the system of ventilation, and unnecessarily wasting fuel.

The State law requires the deliverance of thirty cubic feet of air per minute per pupil, which is a liberal allowance. The plenum system is one giving the best satisfaction, and my be explained, in that, generally, there is installed in the basement a full housing blower type fan provided with heater sections. There is usually not enough attention given to where this fresh air is obtained. The intakes should be distant from any toilet room, chemical laboratories or other places having injurious or obnoxious odors, nor near the surface of the street or court. An intake near the roof is preferred as at that point there is less dust and odor, and the air in consequence is purer. Where it is of necessity near the ground, air screens should be installed. They are designed to cleanse the air of all dust before it passes over the heater sections and consist of a number of baffle plates of cheese cloth. There are also many methods of washing and purifying the air by means of water sprays, moist coke, etc. The air from the fan is distributed through ducts to the top of the various rooms, and in cooling descends, and leaves the room near the floor through vent openings. Where possible, these vent stacks go directly upward through the roof, or sometimes are connected together into one or more chambers in the roof space and there exhausted by a fan. The natural draft of the vent flues, however, is generally all that is required. Where the top story is so occupied that the ducts cannot run upward, they are run downward against the natural direction of the flow of warm air and exhausted by a fan into a large stack that should discharge above the roof.

All toilet rooms and chemical laboratories should have special and separate exhaust vent systems with outlet near the ceiling. By this measure, the direction of the air will be into the rooms and remove the possibility of diffusion of air from obnoxious departments to other parts of the building. In forge shops where down draft forges are used, a special exhaust stack should be placed to take off any smoke from the smouldering fires when the forges are not in use.

Boston has, for two years, been experimenting in an endeavor to successfully regulate the humidity of the air in the class-rooms. The engineers have determined that 40 per cent. of humidity in very cold weather and 50 per cent. in ordinary weather is approximately what is required to insure best conditions, but they further conclude that while the humidifying is practical and can be regulated, the results with the average janitor, due to the necessary attention, are not commensurate with the expense of the installation and maintenance.

The board, however, has decided that since, in its opinion, the moistening of the air is so desirable, it will continue to experiment and see if results cannot be obtained that will justify its final adoption.

I do not know of a more important innovation that should be installed in school construction than the vacuum cleaning system. At the end of each school session the janitor finds an exceptional amount of chalk dust, dirt brought into the school upon the children's shoes, and the general natural accumulation. The dust raised in sweeping the class-room is tremendous, making the place unfit to enter for hours. The vacuum system would be a marked sanitary improvement, and would largely lessen the work of the janitor.

Having briefly touched upon the points of most interest to your Association relative to School Architecture, I respectfully submit the same for your discussion.

Discussion of Mr. Meyers' Paper.

By Francis Bent, Esq.

In the paper that has just been read, Mr. Myers has treated principally of the conditions to be obtained in the construction of new school buildings. I shall bring to your attention another side of the subject, that is, the present sanitary conditions of a great percentage of our school buildings and what can be done to remedy the same and also guard against unsanitary conditions in future buildings.

The State law requires that plans and specifications for all proposed buildings for school purposes and alterations to same, shall be passed upon by the State Board of Education, who in turn shall submit the plans to the office of the State's architect for examination, to see that they comply with the law in regards to size and location of rooms, lighting and ventilation, location and construction of stairs and a number of minor points; nothing whatsoever being mentioned in the law in regard to toilet facilities or the ventilation of such compartments.

Furthermore, while the law states that thirty cubic feet of air per capita per minute must be supplied for each room, no provision is made for testing, after installation, the various systems that claim to accomplish the result, neither is anything said in reference to the elimination of carbon-dioxide from the air.

The result of all this, I venture to say, is that fully ninety (90%) per cent. of the school houses in our State, do not comply with the law in regard to furnishing the proper amount of fresh air to the pupils at the same time are in a very unsanitary condition.

Only a few days ago an architect stated to me that he had been in a school house of some size quite recently, where he saw the open waste from the urinals running through a duct, through which the fresh-air supply to the building was taken, thus passing all the fresh air over this waste and so up into the school-rooms to be breathed by the scholars. I fully believe that almost as bad conditions exist in a majority of the buildings throughout the State. In large cities and towns where we have local sanitary codes, the conditions are of a necessity not so bad, but even there I believe the conditions could be improved by proper regulations being inserted in the present school laws and provision being made at the same time for the enforcement of the laws by inspection at regular intervals of all school buildings before, during and after erection by State inspectors. So much for the conditions as now exist.

An ideal arrangement of the sanitaries for all school buildings would place them as far as possible in a tower or annex to the school building proper, but separated from the same by covered passages; the interior lining of the walls should be of some impervious material, which is, at the same time impossible to deface with lead pencil. This is the custom, I believe, that is being adopted in New York City.

Boston, a city ever in the van as regards school matters, is very particular about this part of the school construction and all fixtures are not only placed in thoroughly ventilated compartments, but each and every fixture has a local vent connecting with a vent shaft so that there is positive ventilation at all times.

As to the flooring of toilet rooms, I can not agree entirely with Mr. Myers. My experience has taught me that a perfectly impervious surface can be obtained on a first-class cement floor. My preference is always for a seamless floor; slate and albedene stone, even in large pieces, and tile have certain objections, as the joints are their weakest parts. On the other hand, cement can be laid without a seam, and by careful trowelling brought to a smooth, polished surface; a finer finish being obtained by treatment with a wax preparation.

I have used, and am still using, a floor (Taylorite) composed of saw dust mixed with a certain cement (magnesium calcite, I believe), which is, to my mind, the very best material yet put on the market, as it can be laid in one piece and run with a sanitary base, and is impervious to moisture. I believe the Boston school authorities rely principally upon an asphalt on concrete.

The experience in Boston seems to have lead them to adopt a heavy short hopper closet or porcelain or poreclain-lined iron latrines, with individual stalls, for the primary and lower grades, and a heavy vitreous wash-down closet for the higher grades. All the seats have local vents, and the main drains and wastes inside the building are readily accessible in masonry galleries or ducts. The urinals used are slate stall urinals, with local vent openings at the floor. With these fixtures the air in the rooms is drawn down and through the fixtures and then up into the main vents.

The first question that would be asked by the average building committee would be, what is the cost of all this?

Now, I hold that in such a vital matter cost should not be considered; but at the same time I do not see why there is anything in these suggestions to make them prohibitory to any school district. In the larger towns and cities we find the building of the school-houses in the hands of capable architects, as a rule; but in the small communities, where economy in its strictest sense is practiced, we find the school-houses left to the tender mercies of unskilled mechanics and laymen, who seem to think that about anything will do for a school-house.

Even when good and capable architects are employed, the tendency of building committees is not to have the best up-to-date sanitary arrangement, and they will not always accept the advice of the architect, thinking perhaps that he desires to run up the expense to increase his commission, and, I am sorry to confess, too often the architect, knowing from past experience the feeling of the average board, is not willing put himself in that false position, and, consequently, specifies the ordinary, cheap, every-day methods which have been used for years and found wanting.

These conditions could be changed by a proper revision of the State school laws, with proper provision for their strict enforcement.

Dr. Edward L. Trudeau, of Saranac Lake, writes me as follows:

"The sanatorium for the treatment of incipient tuberculosis is one of the efficient weapons in our attempt to control the disease, because it arrests and cures those cases which can be cured and arrested, and because it has an immense educational value in scattering all over the land individuals who are thoroughly impressed with the simple methods necessary to prevent the spread of the disease, and who impart their information to others.

"The number of these institutions is growing rapidly, and what we need perhaps more than anything else, in addition, is some provision for the care of advanced and hopeless cases, not with a view to arresting their disease or curing them, but merely on humanitarian grounds, and in order to limit the spread of the infection, as these cases are the most dangerous.

"I think the results obtainable in the treatment of incipient cases have been found sufficiently satisfactory to encourage a combined effort in this direction, for the problem is such a vast one that combined and widespread efforts at limiting the disease can alone prove available, and its cure in the incipient stages is one of the important factors in our great struggle against the disease."

Report of Executive Council.

The Executive Council reported the following 46 names, and recommended their election as members of the Association:

William J. Fink, D.V.S., Jesse Minot, W. F. Brode, J. H. Carver, W. F. Cuthbert, E. S. Johnson, J. J. Mahoney, Josiah Meigh, John Gaskill, Joseph C. Saile, D.V.S., F. H. Bent, R. H. Butterworth, W. C. Tucker, C.E., A. Brower, M. C. Smalley, M.D., G. M. Sinclair, E. T. Steadman, M.D., Boyd McLean, F. E. Lambert, M.D., F. W. Coane, G. T. Bouton, Jos. Payne, M.D., Chester M. Wells, J. E. Kilpatrick, J. V. Laddey, D.V.S., B. D. Evans, M.D., P. Sanford Mallon, M.D., W. P. Melcher, M.D., Nathan Myers, W. T. Carpenter, A. R. Denman, Bleecker Van Wagenen, H. D. Dickerson, C.E., Alex. Potter, C.E., J. B. Smith, Sc.D., R. M. Watson, C.E., James Fitzpatrick, W. H. Macdonald, Henry Hewitt, M.E., R. H. Curts, M.D., J. C. S. Davis, A. H. Dundon, M.D., V. W. Bayles, Mefford Runyon, M.D., H. B. Boice, David S. South.

The Committee also reported the following nominations for officers: *President,* G. K. Dickinson, M.D.; *First Vice-President,* J. B. Dunckleе, C.E.; *Second Vice-President,* W. G. Schauffler, M.D.; *Third Vice-President,* Rudolph Hering, C.E.; *Secretary,* J. A. Exton, M.D.; *Treasurer,* G. P. Olcott, C.E.; *Chairman Executive Council,* Edward Guion, M.D. Also an Executive Council of 23 members and the Standing Committees for the ensuing year. For these, see second page of cover.)

Members of the Association.

Allenhurst—J. M. Ralston.

Arlington—John W. Griffin, James A. Exton, M.D., William J. Fink, D. V. S.

Asbury Park—T. Frank Appleby, T. H. Berringer, D. C. Bowen, Henry Mitchell, M.D., B. H. Obert, Randolph Ross, Jesse Minot.

Atlantic City—Edward Guion, M.D., A. M. Jordan, C.E., A. W. Baily, M.D., Wm. F. Brode, J. Harper Carver, Wm. F. Cuthbert, E. S. Johnson, John J. Mahoney, W. LeRoy Somers, M.D., J. S. Wescott, A. W. Bailey.

Bernardsville—L. E. Tuttle, M.D., Josiah Meigh, M.D.

Beverly—G. T. Tracy, M.D.

Bivalve—John Gaskill.

Bloomfield—Joseph C. Saile, Ph.G., D.V.S.

Bordentown—W. H. Shipps, M.D., Samuel E. Burr, John Virtue Rice, Jr.

Boston, Mass.—F. Herbert Snow, C.E.

Bound Brook—H. M. Herbert, C.E., Charles McNabb, F. H. Bent.

Bridgeton—J. Tomlinson, M.D.

Bulington—Shippen Wallace, Ph.D.

Caldwell—Morris B. Lindsley.

Camden—H. H. Davis, M.D., W. A. Davis, M.D., Henry B. Francis, John O. George, D.V.S., W. I. Kelchner, M.D., John F. Leavitt, M.D., R. H. Reeves, Daniel Strock, M.D., H. G. Taylor, M.D.

Demarest—William E. Davies.

East Orange—T. N. Gray, M.D., Vernon L. Davey, Ph.D., George P. Olcott, C.E., C. C. Vermeule, C.E., W. H. VanWinkle, Roger H. Butterworth.

Elizabeth—Norton L. Wilson, M.D., Hon. E. S. Atwater, A. D. Mulford, Louis L. Richards.

Englewood—Wm. C. Tucker, C.E.

Freehold—Alonzo Brower.

Grantwood—Guy Otis Brewster, M.D.

Gladstone—M. C. Smalley, M.D.

Hackensack—Hon. William M. Johnson.

Hoboken—Graham M. Sinclair, Thomas H. McCann, C.E., E. T. Steadman, M.D.

Imlaystown—F. C. Price, M.D.

Jersey City—G. E. McLaughlin, M.D., Gordon K. Dickinson, M.D., E. W. Harrison, C.E., Ferdinand Sauer, M.D., Henry Spence, M.D., Henry Smellie, F. D. Gray, M.D., Boyd MacLean, F. E. Lambert, M.D., Frederick W. Coane, George T. Bouton.

Kearny—Samuel Worthington.

Lakewood—V. M. Disbrow, M.D., I. H. Hance, M.D., Hon. William J. Harrison, George W. MacMillan, M.D., W. G. Schauffler, M.D.

Leonia—R. J. G. Wood.

Metuchen—A. Clark Hunt, M.D.

Midland Park—Joseph Payne, M.D.

Milburn—David E. English, M.D.

Millville—John W. Wade, M.D.

Montclair—Rudolph Herring, C.E., M. N. Baker, C.E., R. P. Francis, M.D., Edwin B. Goodell, Richard C. Newton, M.D., James Owen, C.E., John O'Brien, Jr., Chester H. Wells, Health Officer; Jay E. Kilpatrick.

Morristown—J. E. Taylor, John V. Laddey, D.V.S.

Morris Plains—Britton D. Evans, M.D., Peter Sandford Mallon, M.D.

Mt. Holly—R. H. Parsons, M.D., W. P. Melcher, M.D.

Newark—Nathan Myers, Arch., Morris R. Sherrerd, C.E., Herbert B. Baldwin, Ph.D., David D. Chandler, R. N. Connelly, M.D., Laban Dennis, M.D., W. S. Disbrow, M.D., H. C. H. Herold, M.D., Addison B. Poland, Ph.D., Harrison Van Duyne, C.E., James L. Hayes, Otto B. Shalk, W. T. Carpenter, Arthur R. Denman.

New York City—George W. Fuller, C.E., F. C. Poucher, G. Everitt Hill, Bleecker Van Wagenen, H. D. Dickerson, C.E., Alexander Potter, C.E.

New Brunswick—David C. English, M.D., William S. Myers, Ph.D., H. Brewster Willis, John B. Smith, Sc.D.

Old Bridge—Asbury Fountain.

Orange—Thomas W. Harvey, M.D.

Passaic—A. Ward Van Riper, M.D., Colin R. Wise, C.E., Robert M. Watson, C.E.

Paterson—John L. Leal, M.D., Wm. Herbert Lowe, D.V.S., Elias J. Marsh, M.D., Elias J. Marsh, Jr., M.D., John C. McCoy, M.D., William K. Newton, M.D., J. Waldo Smith, C.E., Franklin Van Winkle, C.E., James Fitzpatrick, William H. Macdonald, Henry Hewitt, M.E., Robert H. Curts, M.D.

Philadelphia—Charles M. Auerbach, John C. S. Davis.

Point Pleasant—Warren Hardenberg.

Plainfield—Charles J. Fiske, Andrew J. Gavett, C.E., B. V. D. Hedges, M.D., J. B. Probasco, M.D., Norman H. Probasco, M.D., L. R. Thurlow, Arthur Hall Dundon, M.D.

Princeton—V. W. Bayles, C. F. Brackett, M.D., Gen. A. A. Woodhull, M.D.

Riverton—Alexander Marcy, Jr., M.D.

Red Bank—Edwin Field, M.D.

Rahway—Fred. W. Sell, M.D.

Rutherford—S. E. Armstrong, M.D.

Short Hills—Stewart Hartshorn.

South Orange—John B. Duncklee, C.E., Spencer Miller, Mefford Runyon, M.D.

Summit—B. S. H. Baker, C.E., John E. Rowe, Jr., D.V.S.

Titusville—A. W. Hartwell.

Trenton—J. B. Betts, H. B. Boice, William Elmer, M.D., James M Green, Ph.D., George W. McGuire, R. B. FitzRandolph, A.C., F.R.M.S., Hon. William M. Lanning, John C. Smock, Ph.D., David S. South.

Verona—H. D. McCormick, M.D.

Westfield—J. B. Harrison, M.D., R. R. Sinclair, M.D.

Williamstown—Luther M. Halsey, M.D.

Woodside—Clyde Potts.

PROCEEDINGS

OF THE

Thirty-third Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, Oct. 1 and 2

1907

IN THE

Marlboro-Blenheim Hotel, Atlantic City, N. J.

TRENTON, N. J.:
MacCrellish & Quigley, State Printers,
1907

Officers for 1907-1908.

President,..................JOHN B. DUNCKLEE, C.E., South Orange.
First Vice-President,.......WILLIAM G. SCHAUFFLER, M.D., Lakewood.
Second Vice-President,.............RUDOLPH HERING, C.E., Montclair.
Third Vice-President,.............EDWARD GUION, M.D., Atlantic City.
Secretary,........................JAMES A. EXTON, M.D., Arlington.
Treasurer,.....................GEORGE P. OLCOTT, C.E., East Orange.
Chairman Executive Council,..JOHN B. SMITH, Sc.D., New Brunswick.

Executive Council.

D. E. English, M.D.,....Millburn.
W. H. Shipps, M.D., Bordentown.
Wm. J. Harrison,.....Lakewood.
T. Frank Appleby,..Asbury Park.
Thos W. Harvey, M.D., Orange.
H. C. H. Herold, M.D.,..Newark.
Henry B. Francis,.......Camden.
John W. Griffin,.......Arlington.
A. Clark Hunt, M.D.,..Metuchen.
R. H. Parsons, M.D.,..Mt. Holly.
M. R. Sherrerd, C. E.,...Newark.
B. V. D. Hedges, M.D., Plainfield.
A. W. Bailey, M.D., Atlantic City.
T. N. Gray, M.D.,...East Orange.
G. E. McLaughlin, M.D., Jer. City.
Henry H. Davis, M.D.,..Camden.
Stewart Hartshorn,..Short Hills.
Jos. Tomlinson, M.D., Bridgeton.
Charles J. Fiske,.......Plainfield.
Alex. Marcy, Jr., M.D., Riverton.
J. S. Westcott,......Atlantic City.
E. W. Harrison, C. E., Jersey City.
Clyde Potts, C.E.,...Morristown.

Honorary Members of Council:—The ex-Presidents—Prof. C. E. Brackett, M.D., LL.D., James M. Green, Ph.D., William K. Newton, M.D., Henry Mitchell, M.D., Dowling Benjamin, M.D., George P. Olcott, C.E., C. Phillips Bassett, C.E., Addison B. Poland, Ph.D., David C. English, M.D., Shippen Wallace, Ph.D., James Owen, C.E., Vernon L. Davey, Ph. D., Daniel Strock, M.D., Herbert B. Baldwin, Ph.D., H. Brewster Willis, John L. Leal, M.D., M. N. Baker, C.E., Norton L. Wilson, M.D., H. M. Herbert, C.E., Gordon K. Dickinson, M.D.

Committees.

Publication Committee—David C. English, M.D., Chairman, New Brunswick; Henry Mitchell, M.D., Asbury Park; James A. Exton, M.D., Arlington.

Committee on Membership and Registration—Edward Guion, M. D., Chairman, Atlantic City; G. E. McLaughlin, M.D., Jersey City; B. V. B. Hedges, M.D., Plainfield.

Committee on the Organization of Anti-Tuberculosis Societies in New Jersey—Thos. W. Harvey, M.D., Chairman, Orange; Irwin H. Hance, M.D., Lakewood; D. C. English, M.D., New Brunswick.

Committee on the Education and Training of Health Officers—John L. Leal, M.D., Chairman, Paterson; B. V. D. Hedges, M.D., Plainfield; G. K. Dickinson, M.D., Jersey City; H. C. H. Herold, M.D., Newark; A. A. Woodhull, M.D., Princeton.

Committee on Medical and Sanitary Inspection of Schools and Sanitary Instruction in Schools—W. G. Schauffler, M.D., Chairman, Lakewood; Joseph Tomlinson, M.D., Bridgeton; Richard C. Newton, M.D., Montclair; J. Brognard Betts, Trenton.

Honorary Members of Council:—The ex-Presidents—Prof. C. F.

Legislative Committee—George P. Olcott, C.E., Chairman, East Orange; Henry Mitchell, M.D., Asbury Park; H. Brewster Willis, New Brunswick; Joseph Tomlinson, M.D., Bridgeton.

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CONTENTS.

Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers, and other citizens of our State interested in Sanitation as related to our homes, our schools and our municipalities.

Any citizen may become a member of the State Association on application to the Secretary or any member of the Executive Council, on the day of meeting. The membership fee is two dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of methods relating to the prevention of sickness and the promotion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise, and preventing harmful, sanitary legislation, and also to aid the State and local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health, a part of the annual meeting is devoted to such special subjects as relate to the work of local Boards of Health. Every local board should have present at the annual meeting its Health Officer, Inspector or some other active member. The information secured for the benefit of each locality far more than compensates for the slight expense.

MINUTES

OF THE

Thirty-third Annual Meeting of the New Jersey Sanitary Association.

October 1 and 2, 1907.

Officers, 1906–1907.

President, ...GORDON K. DICKINSON, M.D., Jersey City.
First Vice-President, ...JOHN B. DUNCKLEE, C.E., South Orange.
Second Vice-President, ...WM. G. SCHAUFFLER, M.D., Lakewood.
Third Vice-President, ...RUDOLPH HERING, C.E., Montclair.
Secretary, ...JAMES A. EXTON, M.D., Arlington.
Treasurer, ...GEORGE P. OLCOTT, C.E., East Orange.
Chairman Executive Council,......EDWARD GUION, M.D., Atlantic City.

The Thirty-third Annual Meeting of the New Jersey Sanitary Association was held in conjunction with the meetings of the American Public Health Association, in the Marlboro-Blenheim Hotel, Atlantic City, N. J. The first session of the meeting of the Sanitary Association was held in the West Solarium of the hotel, and was called to order at 3:15 P. M., Tuesday, October 1, 1907, by Dr. Edward Guion, Chairman of the Executive Council. Prayer was offered by Rev. H. M. Gesner, Pastor of the First Presbyterian Church, Atlantic City, N. J.

DR. GUION—As Chairman of the Executive Council, it is my privilege to make a few remarks at this time, in the way of announcements.

The preliminary announcement and the program has already made you acquainted with the fact that we have met somewhat earlier than usual, so that we could have the privilege of meeting at the same time and place as the American Public Health Association, and thus gain the benefits to be derived from close contact to such an illustrious body. With that object in view, the session of the New Jersey Sanitary Association has been shortened, and the members are invited to join in the discussions of A. P.

H. Association. The entertainment provided is for the benefit of both associations, and it is hoped that you will all take part in the social as well as the scientific part of the program. For a list of the entertainments you are referred to the last page of the program of the A. P. H. Association.

Atlantic City is proud to have you with her again as her guest, and we assure you that we consider the best none too good for you.

An address on "The Evolution of Associations, with especial reference to the State Sanitary Association," was then given by the President, Gordon K. Dickinson, M.D., Jersey City, N. J.

(For address of the President see subsequent pages.)

The President—The program committee of the New Jersey Sanitary Association felt that they would have but one afternoon in which to work, and concluded that a symposium on one topic would be better than to undertake several topics, and milk was selected as the subject for the symposium. The subject was well worked out at the Milk Commission meeting, held earlier in the year, and it has also been threshed out at other times. I was told by my friend, Dr. Luck, that forty years ago Frank Leslie started a crusade against dirty milk, and dirty stables, in his paper. We have been fighting against dirty milk all these years, and it now appears as if the time is approaching when we can look on the most of the milk which we shall consume as being health giving. In order to get at what the milk of the future may be, we have gotten out a symposium. Naturally the ideal control of milk comes last, but as Dr. Darlington is compelled to leave on an early train, I will ask him to read his paper first, on the "Municipal Control of the Ideal Milk of the Future."

(For paper by Dr. Thomas Darlington, of New York City, see subsequent pages.)

The President—The next paper, entitled "Medical Control of the Ideal Milk of the Future," will be presented by Dr. H. L. Coit, Newark, N. J. I find Dr. Coit is not present, and as there is no one here to represent him, we will go back to section one, and Prof. R. A. Pearson, of Ithaca, N. Y., will present the subject of "Ideal Dairying."

(For paper by Prof. Pearson on this subject see subsequent pages.)

THE PRESIDENT—Prof. E. B. Voorhees, of New Brunswick, N. J., will also talk to us on the subject of "Ideal Dairying."

(For paper by Prof. Voorhees see subsequent pages.)

THE PRESIDENT—We will now take up subject number two, and Dr. C. B. Lane, of Washington, D. C., will speak to us on the subject of "Ideal Milk and Some Phases of the Milk Question."

(For paper by Dr. Lane see subsequent pages.)

THE PRESIDENT—Before we proceed to the discussion of this subject, I would like to make the announcement that Col. Olcott, our Treasurer, will not be with us, and in his absence members are requested to pay their dues to Mr. Merrell, the stenographer, who will act as Treasurer *pro tem.* Dr. Exton, the Secretary, also requests that members will not fail to register. After we conclude our discussion of the papers, I will call for reports from the different committees. Mr. Topham, Health Officer of Syracuse, N. Y., has kindly offered to take the place of Dr. Harvey W. Wiley, of Washington, D. C., who was to speak to us on the subject of milk, but who is unable to be present.

MR. TOPHAM—I was influenced by your Chairman to speak this afternoon. He said I resembled Dr. Wiley so closely that he was going to call upon me to open this discussion. I look upon Dr. Wiley as a giant in the work he has done and is doing, and when I consider myself I seem to appear very small. All I have to say to you this afternoon is to present some simple facts in reference to the milk question. I am a health officer in the city of Syracuse, and this is my third time of serving as health officer of the city. The work has always had a call for me, and so without political influence, or anything of that sort, I am serving my third term. In a discussion on this subject, which I had with the Commissioner of Public Safety in our city, under whom I work, he said, "This question is so great that my judgment is that we shall not take it up; we can do nothing with it." I said to him that all that would be necessary for us to do in this matter is to take one step at a time, that this great problem is not the first giant that has been downed in the world's history. We can do something; let us take the first step. What was it? I was commissioned to obtain, as the first step in our work, a competent dairy inspector. In my search for such a person, about the first man with

whom I came in contact was Prof. Pearson, of Cornell University, who has just spoken to us on the subject of milk. I went to Cornell to get my man, and I tried hard to get a good man, but he would not come. I have had a letter from him since, in which he said that he was sorry he did not come. I was sorry, too; it nearly upset me, but I persevered. Now there is one fact which I wish to bring to your minds. If you are going to succeed in any sanitary work you must acquire the ability to pick men to do the work. You cannot do it all. If a man thinks he is the whole thing, he is going down and out. I finally chose a dairy inspector, a Scotchman, and a competent man, and I made no mistake. I claim the lines which must be followed out are educational lines with the farmer. Go right to the farmer, his wife and children, because in some of these cases you must begin with the children. The farmer, who has been in the dairy business for thirty years, is nearly a hopeless case, and you can reach him only through his children. Let me tell you one of the results of our work. We have inspected nearly all the dairies supplying milk to the city, and have sent a letter to each dairyman with his score card, and have asked him to consult it. Mr. Congdon, a dairyman, who lives about four miles from our city, told me he did not like his score card. He said, "I have twenty cows, which I feed with brewers' grains, and you have given me nothing on my score card. I am afraid that my patrons will see that score card, and I don't want them to see it. If they see that I get no score on the feed which I give my cows, possibly I will be in trouble." We are endeavoring to promulgate, in the city of Syracuse, a publicity card that shall be put in our public library. Recently our Librarian called me up, and said, "A large number of people have been to me in a week, asking to see the publicity card," and he said, "what can I tell them; are we going to have the publicity cards?" I said yes, but it would take until the first of May to put them there. As Health Officer of the City of Syracuse, I feel that a responsibility rests upon me in this question of bettering the milk supply of the city. The lives of these children, that Dr. Lane has spoken about, rest somewhat upon my shoulders as Health Officer. I realize somewhat that responsibility, and so far as in me lies, I propose to go on taking other steps to meet this responsibility. The death rate among little children in Syracuse during the months of July and August is appalling

to me. A little village south of us shows that they lowered the death rate, and saved the lives of twelve little children during the year 1906. The City of Rochester has shown that they have lowered the death rate in infant mortality, and they claim that it is largely due to the betterment of milk. I believe that this is true, and I believe that this matter is worthy of our earnest consideration. There is one point more. I was at a meeting in this city in June, when the question about certified milk was discussed. Dr. Coit was here, and some of the men who have spoken this afternoon, and I learned one thing which has been upon my mind, and that is the full value of milk. I was told by a responsible man that milk at fifteen cents a quart was of more food value than any other food product that could be bought at the present day in the markets at fifteen cents. I don't know if it is true. A quart of pure milk is of infinitely more value than a dirty, poisonous, dangerous quart of milk. I have told you all that I have to say upon this subject, and I am thankful to stand here and look in your faces. I have been repaid by being able to come here and listen to these excellent papers.

THE PRESIDENT—We shall have to limit our remarks in this discussion to five minutes.

MR. M. N. BAKER, Montclair—I think it very unfortunate that the strong legislation upon milk, which has been somewhat marked of late, has come just at the time when the price of feed and the price of labor has so greatly increased. It seems to cloud the issue somewhat, and the matter of expense is urged against improvement in the collection of the milk, and sometimes made an excuse, which is unfortunate. In Montclair, during the last eight years, we have enforced in our ordinance practically all of the sanitary provisions outlined here to-day, and a great many others besides, and until this increase in the price of feed arose there was very little increase in the price of milk in the town. I want to say, also, that in our health code we have inserted the provision for the tuberculin test of all cows from which milk is delivered in the town of Montclair, and all the dealers, except one, supplying the town with milk, have complied with that provision, and that dealer has complied with it in part. In his case there are some eight hundred cows involved, and some time, of course, is necessary to bring this matter about. We look upon this matter as a recent step in advance. We have had but very

little difficulty in getting dealers to put the test upon the cows. They have to file with the Board of Health a reaction chart of every cow that they keep in their herds. The new ordinance is printed in the last annual report of our Board, and can be obtained by anyone interested by addressing the Health Officer of Montclair.

In response to questions, Mr. Baker stated that he could not give the figures off-hand, showing the percentage of cows that reacted. He said some dairymen have claimed that it was nobody's business but their own, so long as they excluded the cows from their herd. In some instances the reaction is very low, while in others it has gone up to a considerable figure. Before we put this provision in our requirements, the Health Officer went to every herd, and all cows were subject to a general examination, and in one or two instances a very large percentage were rejected on account of such examinations. We have all sorts of people in Montclair. There is a very considerable population of negroes and Italians, altogether numbering about two thousand out of sixteen thousand, and in addition to that there are other people in very poor circumstances. This, of course, is a point that we must think of. All of the certified milk will go to a certain few, but we want our poor people to have just as good milk as the rich, and the saving of doctor's bills will outweigh the cost. Milk has sold at eight cents a quart ever since I have been in the town, so there has been very little difference in price, except for certified milk or fancy milk, until recently, on account of the increase in the price of feed. Most of the milk is now sold at eight, but some at nine and ten cents a quart.

PROF. JOHN B. SMITH, New Brunswick—The point is just this. At eight cents a quart, possibly, a producer could furnish good milk, but if he furnishes it to a city, and it passes through two or three hands, the farmer only gets about four and one-half cents a quart.

MR. BAKER—The middleman is eliminated to a large extent in the milk supplied to our town, but some is produced by dairymen one hundred and fifty miles distant, and this is delivered and sold at the same price.

DR. HOLLISTER—It seems to be a very important point that while the milk may be brought from the dairy with a low number of bacteria, after it is left at the house of the consumer it becomes warm before it is taken in the house,

and in that way the number of bacteria increases very rapidly. It seems to me that it is possible to prevent this in some way, either by the time of delivery of the milk, or by some arrangement for protecting that milk from the direct rays of the sun. In many instances in the case of experiments, which I observed of milk which had been left at houses, it was found to have a temperature practically like that of the body, having been in the sun for some time, and such milk will, of course, show large numbers of bacteria.

THE PRESIDENT—If there is no further discussion we will proceed to hear the reports of committees, which we passed over in order to give Dr. Darlington time to catch his train. We will first hear from the Publication Committee, of which Dr. D. C. English is chairman.

DR. ENGLISH—We have nothing special to report. We regret exceedingly that the last publication came out so late, caused by failure to get one of the papers. We wrote for this paper, found it had been sent to the wrong person, and had been mislaid, and when we got ready to print our report our printer had a large amount of legislative matter to print, which was given precedence, and that made our report late. As chairman I wish to express the thanks of the Committee for the prompt return of proof sent out, as that has a great deal to do with the early issue of the annual reports.

THE PRESIDENT—We will next hear from the Committee on Membership and Registration, of which Dr. Edward Guion is chairman.

DR. GUION—The Committee on Membership would report that circulars have been sent out in accordance with suggestions made by the Executive Council, and a report will be made to the Executive Council.

THE PRESIDENT—The next is the Committee on the Organization of Anti-tuberculosis Societies in New Jersey. Dr. Thomas W. Harvey is chairman of this committee. Dr. Harvey is not present. We will hear from the Committee on the Education and Training of Health Officers, Dr. John L. Leal, chairman.

Dr. Leal was not present at this time, but it was stated that it was his desire that the committee be continued for another year, with the hope of soon having a meeting with

the trustees and faculty of an institution which is considering the proposition to organize a specific course of study.

DR. D. C. ENGLISH—If you will permit me, I would like to state, in the absence of Dr. Harvey, that there has been a decided advance in the establishment of local anti-tuberculosis societies in New Jersey. The State Association is a very active body, and I take great pleasure in announcing that Dr. Dickinson, our president, is president of the Anti-tuberculosis Association this year, and that Mr. Smallwood, the secretary, is doing most efficient work in establishing local associations throughout the State.

THE PRESIDENT—Dr. Joseph Tomlinson, chairman of the Committee on Medical Inspection of Schools, and Col. George P. Olcott, chairman of the Legislative Committee, are both absent. Is there anyone present to report for these committees? It was stated that there was no report to make.

The President announced that there would be a meeting of the Executive Council at the close of the present session, and the motion to adjourn was then made and carried.

SECOND SESSION.

This session was called to order by the President at 9:45 A. M., Wednesday, October 1st, in the Park Avenue Hall of the Marlborough Hotel.

THE PRESIDENT—If there is any man present who has not paid his dues the Treasurer wishes to see him. The appointment of committees is not down on the program, and, after discussion with some of our members, I would like to say that I will continue all committees the same as last year, except that on the medical inspection of schools. Mr. Duncklee has a resolution to offer in relation to this committee.

The following resolution was then offered by Mr. John John B. Duncklee:

"*Resolved*, that the Committee on Medical Inspection of Schools be designated 'The Committee on Sanitary Inspection of Schools and School Children and Sanitary Instruction in Schools.'

"*Resolved*, that the subject of sanitary instruction in schools be referred to this committee for report at the next annual meeting."

Dr. Henry Mitchell—Inasmuch as the law provides for the medical inspection of schools, it would seem to be wise to retain the word "medical," in part at any rate. Suppose we should say "medical inspection of pupils and sanitary inspection of buildings." It seems to me advisable to retain the word "medical."

Mr. Duncklee—I will so amend the resolution.

Prof. Smith—I don't see any objection to including both terms.

Mr. Baker—I don't think we want to lose sight of the "medical" part. I move that the resolution be amended to read "medical and sanitary."

Dr. Mitchell—We do not want to say "sanitary inspection" of pupils. The word "medical" might be retained in reference to individuals, and the word "sanitary" in reference to buildings.

Mr. Baker—Would it not be sufficient to have the title "medical and sanitary inspection of schools"? That covers everything, the committee to be instructed to take into account the sanitary inspection of buildings.

The President—It is largely a matter of taste.

The resolution was finally amended to read "medical and sanitary inspection of schools and sanitary instruction in schools," and in this form it was adopted.

The President—I will nominate on that committee Dr. W. G. Schauffler, Dr. Richard C. Newton, Dr. Joseph Tomlinson, Mr. J. Brognard Betts. We will now listen to the reading of the report of the Treasurer. (For report of Treasurer see subsequent pages.)

The President—You have heard the report, how do you propose to have it audited in the absence of the Treasurer?

Dr. English—I would suggest that a committee of members living in the neighborhood of the Treasurer be appointed to audit it.

The President—Will you suggest the names?

Dr. English—I would suggest Dr. T. W. Harvey and Dr. T. N. Gray.

The President—I appoint the gentlemen named to report at the next annual meeting of the Association. Dr. Guion, will you report on the Executive Council meeting?

Dr. Guion—I have nothing to report, but will read a letter which I have received. The letter was then read by Dr. Guion from officers representing the International Stewards Association asking the State Sanitary Association to recommend to health officers the appointment of a competent steward in each district as an inspector of kitchens and all places where foods are handled and prepared, &c.

Dr. Leal—I move that the letter be laid on the table. This motion was carried.

The President—Dr. Exton, the Secretary, will give us the report of the Executive Council.

Dr. Exton reported that the Executive Council had adopted the following resolution:

Resolved, That the Committee on Publication be authorized to have the annual report of the New Jersey Sanitary Association published by whoever in their judgment they may consider best, it being understood that the report shall be in the usual form and the expense not materially greater than usual.

Also that they presented the following nominations for officers as recommended by the Committee on Nominations:

President, John B. Dunckle, C.E., South Orange; First Vice-President, W. G. Schauffler, M.D., Lakewood; Second Vice-President, Rudolph Hering, C.E., Montclair; Third Vice-President, Edward Guion, M.D., Atlantic City; Secretary, James A. Exton, M.D., Arlington; Treasurer, George P. Olcott, C.E., East Orange; Chairman Executive Council, Prof. John B. Smith, Sc.D., New Brunswick; and that Clyde Potts, C.E., Morristown, be added to the Executive Council. The Council also recommends that the following gentlemen nominated for membership in the Association be elected: Whitfield Gray, D.V.S., Newton; Weldon D. Griffin, Dover; William C. Smallwood, Newark; William H. Chew, Salem; Edward J. Heil, Roosevelt; John T. Nagle, M.D., Oceanic.

Mr. Dunckle—By a later vote the Council recommended that the next meeting of the Association be held at Lakewood at the usual time, and I move that the minutes of the meeting of the Executive Council be amended by adding said recommendation. This motion was carried, and the minutes were so amended.

The President—You have heard the reading of the report. Is there any further discussion?

Motion was made and carried that the report as amended be accepted.

Dr. English—I move, Mr. President, that the Secretary cast the ballot electing the officers named by the Nominating Committee, the names of which officers have just been read by the Secretary, with the addition that the members of the Executive Council of last year be re-elected. The report merely presents an addition to the Council without any reference to the re-election of the entire Council. . This motion was seconded and carried.

Dr. Leal—I move that the gentlemen proposed for membership and approved by the Council be elected. This motion was carried.

Dr. Leal—I was absent from the room when the report of the Committee on the Education and Training of Health Officers was called for. We have hopes at the present time of making some arrangement with the State Agricultural College; that is, that we may induce them to form a course for the instruction of health officers and subordinate officers in connection with that institution. In order to accomplish that it may be necessary to make some change in the law governing the Agricultural College, and it is possible that it should be done at the coming legislative session before the Association meets again, and it was the desire of the committee that they be empowered by the Association to push any legislation necessary for this purpose. The committee is composed of the following persons: B. VanD. Hedges, M.D.; G. K. Dickinson, M.D.; H. C. H. Herold, M.D.; A. A. Woodhull, M.D., and myself. Perhaps it could be made subject to the approval of the President, or something of that sort. It would be too bad to waste a year in securing the necessary legislation.

The President—This is an important matter, and I hope we will all agree with Dr. Leal.

Mr. Dunckle—I would like to ask if it would include sanitary inspectors.

Dr. Leal—Yes, it would include both health officers and sanitary inspectors. I will make a motion that the Committee on the Education and Training of Health Officers be empowered to advocate such legislation as may be necessary to secure their object in the name of this Association.

Prof. Smith—In view of the fact that we have a Legislative Committee, would it not be well to make reference to

a joint committee consisting of this committee and the Legislative Committee?

THE PRESIDENT—The Legislative Committee is composed of the following persons: Geo. P. Olcott, C.E.; Henry Mitchell, M.D.; H. Brewster Willis, and Joseph Tomlinson, M.D.

The amendment proposed by Prof. Smith was accepted, and the motion was seconded and carried.

PROF. SMITH—There is one other little matter that I wish to bring before you. One speaker was invited to come here to address the Association on the subject of "Milk." The impression was given to him that the Sanitary Association would pay his hotel bill as a recompense for preparing his paper. I move that the Association be authorized to pay this bill.

DR. LEAL—I second the motion.

DR. ENGLISH—I would like to ask if there are any others, and, if so, if we ought to include them?

DR. MCLAUGHLN—I am not certain, but think probably our chairman can tell us about that matter.

THE PRESIDENT—We very carefully avoided anything of that kind. The motion was seconded and carried that this bill be paid.

DR. EXTON—I present bills for payment of the Committee on Membership, the Committee on Arrangements and the Executive Committee.

On motion it was ordered that these bills be paid, and motion for final adjournment was made and carried.

Treasurer's Report.

GEORGE P. OLCOTT,

Treasurer, in account with the New Jersey Sanitary Association.

RECEIPTS.

1906.			
Nov. 16.	To balance cash on hand,	$253 29	
1907.			
Sept. 26.	To dues received to date,	342 00	
			$595 29

DISBURSEMENTS.

1906.			
Nov. 17.	Edward Guion, Membership Com. expenses,	$23 00	
	Chas. T. Merrill, stenographer,	23 20	
	W. H. Spence, printing for Secretary,	40 25	
	J. A. Exton, expenses as Secretary,	16 15	
	Postage, State Board of Health,	77	
	Laurel-in-the-Pines for guests,	15 50	
1907.			
Jan. 30.	Stamps and envelopes for Treasurer,	5 40	
	Copies List of Members, Sect'y and Treas.,	6 00	
May 6.	W. H. Spence, printing,	27 75	
	J. A. Exton, Secretary,	21 40	
July 10.	D. C. English, exp. Publication Com.,	14 50	
Aug. 13.	MacCrellish & Quigley, printing reports, etc.,	135 85	
19.	J. A. Exton, Secretary, expenses,	23 85	
Sept. 24.	W. H. Spence, printing programs, etc.,	20 75	
	J. A. Exton, Secretary, postage, etc.,	5 50	
	G. P. Olcott, Treasurer, postage,	1 40	
			381 27
	Balance cash on hand,		$214 02

Respectfully submitted,

GEORGE P. OLCOTT,
Treasurer.

PRESIDENT'S ADDRESS.

The Evolution of Associations—With Special Reference to the State Sanitary Association.

BY GORDON K. DICKINSON, M.D.

Whosoever has become interested in some topic which to him is alive, or who has seen the need for action in affairs of public or private import, and who has endeavored to call together a number of people to interest them in his scheme and to organize, can realize its difficulties, the slowness with which some perceive the need of action, the few who are ready, and the still fewer who will be good lieutenants and carry matters along. One naturally becomes philosophical and sees but little difference in the action of man and that of the lower animals, and indeed we have that in us, variously demonstrated, which shows our lowly origin. The germ cell, from which we originated, and the cells of the body possess the properties of the amoeba—of storing up energy and delivering it, of motion, and of reproduction. The pineal gland shows undeniable traces of being a rudimentary unpaired organ of sight, giving evidence that we were once lobsters, crawling on our stomachs. In the neck, particularly in embryo, we find the branchial clefts, structures more fully developed in the fishes; but, more wonderful than all is the biochemical fact that the blood of the anthropoid ape reacts as does that of man when mixed with the serum of some other animal, showing conclusively that the hiatus between man and the higher apes is less than that between them and those just below in scale.

That man has not divorced the traits inherited from what he calls, in his conceit, the "lower animals", is also shown in the activities of his brain. How variously does he deport himself in his environment, his business life, his social life, and even the way in which he takes his pleasures—all showing the stigma of the inheritance of years of habit.

For convenience of argument and application, animals may be divided into three types: First, we have the flesh eaters, strong and powerful, of great energy, able to fight for themselves and given to fighting, independent, unsociable, quick in action but of no great endurance, possessing great resisting power as to disease conditions, but generally short-lived. Second, we have the vegetable eaters, ordinarily slow of action, with social instincts, who generally live in herds and follow a leader, not naturally combative, obtaining protection through flight rather than force, of great powers of endurance, but less resistant as to disease conditions. The third type is the ground-hog, who lives by himself, squatting on a little pile of dirt, self-complacent, getting fat on what he can dig in the neighboring fields, never wandering far from his home, and seeking protection, not in combat nor in assistance from others of his kind, but by hiding in the ground.

Thus we have outlined the several characteristics of man himself. Some men are long-headed, have hungry minds, restless dispositions, are not happy unless they are solving some problem, forever searching into the unknown, acquiring information through experience, and acting through intuition as well as logical deduction. These men keep a pace ahead of their contemporaries; they disturb the community by calling attention to accumulated superstitions, half truths which are fiction, irregularities the result of habit. Another class is round-headed, intelligent, appreciative, booky, pliable, ready to co-operate, excellent in execution and of inestimable value in association work. There is one individual who never joins our societies, who does not like the members of the association in his neighborhood, who finds fault with the ethics of one and the personel of another, ignorant of his ignorance, who hum-drums his practice and exists on experience personally acquired and what knowledge may have been given him in school life. These are the men I term "ground-hogs", of no value whatever to the profession, and often of little to the community.

The first convention historically noted is that of the fallen angels, who, after finding themselves dropped from Heaven and in a strange nether place, convened to see how they could retaliate on the Almighty. Milton reports "devils and devils damned firm concourse held, men only disagree," and it is well for man that we are not all of one mind, for had we been, as little progress would have been made by him as

resulted from that historic convention. Man's first impulse is known as selfishness, which by theologians is called obliquity, but which in reality is but a survival of the inherent desire for self-protection.

As man's fore-brain grows his mind enlarges, and observations increase in number, so does his desire to meet his companions and to talk of himself, of his experiences, and of his opinions, of the weather and his neighbor's errors. The rapid grŏwth of civic centers and increased facilities for inter-communication have so communized the masses that many matters have now come to be of mutual interest and importance. At the first it was the church and the post-office, but by rapid proliferation we have the trade unions, benevolent associations and associations connected with about every occupation and branch of study existing.

And it is but natural as therapeutic medicine was found to be inefficient and often failing to evolve success that preventive medicine should appeal to the lay mind as well as to the professional. Like all matters which almost require an arithmetical mind to see their commercial value, which do not directly increase the wage of an individual, and which, furthermore, are almost too altruistic to be comprehended, it took years for those politically occupied to assent where assent was needed.

An association to gain success must have sufficient reason for its existence; there must be a general need for the consideration of the problem it is supposed to meet; it must be a happy combination of men with strong individuality, good executive ability and known diplomacy, and men who are conservative, a term taken nowadays to mean people of less intuition than logic. The forceful man who intuitively sees a need, who approaches difficulties without doubt, who magnetizes and in his magnetism brings co-operation is by all odds the best leader. Lieutenants and co-operators are more faithful, untiring and helpful if of the other class. Rarely does an organization succeed which contains too many or even more than one of the first class, for jealousy will be engendered, and where, as is often the case, different roads lead to success and the fulfillment of the end, they will be severally championed and success not attained.

The needs of sanitation were first recognized by the English, and one Elisha Harris, of Albany, brought the contagion to this country, and the late Ezra M. Hunt, of Metuchen, a personal friend and great admirer of Elisha

Harris, is the one who originated the movement in this State, a man of broad education, keen intellect, quick intuition, of gentlemanly bearing, courteous to all classes, interested alike in the talented and in the young physician. How well do I recollect meeting him at Atlantic City in the early 80's, when he put his arm around me and coaxed me as if I were a physician of experience to do my duty in the profession, to study and to write and read papers before the association. It was through the influence of this healthy-blooded man of sound mind brought to bear upon his confreres (men of equal mind), upon those whom he met at our State meetings and upon his acquaintances among the farmers, etc., of the State that the State Sanitary Association was organized.

The origin of the State Sanitary Association is but a repetition of the old story—brains, much time and a public scare. In 1849 the State Medical Society memorialized the Legislature requesting more complete public health laws, but without success. In 1853 the Burlington County District Society did the same. As a result of the agitation developed and the publicity obtained resolutions were again offered at the State Society meeting in 1866 by Dr. E. M. Hunt, again memorializing the Legislature as to matters of State hygiene. The Legislature at last hearkened and appointed a State Sanitary Commission, consisting of five physicians, Drs. J. B. Coleman, R. M. Cooper, T. Ryerson, E. P. Nichols and E. M. Hunt, to report in one year.

It is evident that by this time the Legislature was alive to the public need, even though the Commission's recommendations for a State Board of Health failed of passage by a small majority. The agitation continued and district societies were called upon to circulate petitions, and a Committee on Public Health was appointed in 1868 by the State Medical Society, consisting of Drs. Hunt, Pennington, Elmer, Cooper and Wickes. In 1869 a State health law, a bill similar to that of Maine, was presented.

After repeated efforts by sanitary committees of the State Medical Society and the press, all emphasized by the cholera epidemic, at last in 1873–74 another commission of six was appointed to make extended inquiry into the unsanitary condition of the cities and rural districts. Their report, published through the press in pamphlet form, led to a sanitary convention, which was held in October, 1875. The outcome of this convention had a dual effect—the State

Sanitary Association and the State Board of Health act, to which Governor Bedle affixed his signature on May 17th, 1877.

Altruistic associations, such as the State Sanitary, are often short-lived. The conditions giving origin to the same must be all important and inexhaustive that its life be continuous. Sanitation being yet in its infancy, and not a distinct profession, it is a happy fact that this association is made up of men of diverse minds: physicians, educators, lawyers, engineers, plumbers and others, so, by a process of cross fertilization a growth is obtained remarkable for vigor and productiveness. As a happy result of this complexity of membership the topics discussed sometimes have a medical bearing, sometimes a legal, or an educative, or an economic. A resumé of the work done by this society shows an unusual amount of attention accurately applied to the numerous problems brought before it. The early papers of the association were mainly on urgent and popular problems of that day, consisting chiefly of researches on sewerage, water-supply and school hygiene. Not until 1884 was any attention given to the problem of milk. It is a credit to the association that its members have not tired of reiteration; that old topics are taken up as new and fresh aspects exploited; and the papers that have gone forth to the public have demonstrated their power as shown by results obtained throughout the State.

The history of sanitation is the history of the medical mind, but not until recent years did the profession realize its power in the prevention of disease conditions. It seems strange that many of the early papers of our society were written on the influence of weather over diseases, which was one of the conditions long thought to be of great importance. As one glances over the titles of the papers read not only before this association in the past, but in the early meetings of the State Medical Society, he is greatly impressed by the great lack of accuracy, necessarily of observation, as to the cause of disease states. Perhaps the most important knowledge, the acquisition of which has led to the production of scientifically accurate work and papers relating thereto, has been obtained in the physiologic and bacteriologic laboratories. If we were to have blotted out all information derived through experimentation on live animals and in the laboratory, the retrocession would be tremendous.

Sanitation in this State has been hampered in a measure by the Law of 1887, and if the writer's premises be good and the argument correct, how much better success would have been obtained throughout the State, if, instead of Boards of Health of ten (five or whom are physicians) the law had stated that the executive officer of each city, town or municipality should appoint *one*, who may, if he so desires, take unto himself two others to act in matters of local sanitation. Less cumberous health boards, and centralization of all authority and responsibility, would clear the atmosphere of political interference on the outside and wrangling and selfish desires on the other.

A critical resumé of this association's work develops nothing for adverse criticism. Each profession in this composite body has risen to express itself upon all public health matters, and each member has gone home better informed and more ready and willing to advance the cause of sanitation in his locality.

The great handicaps of our work are, first, the universal lack of systematic and specialized education along its lines in the schools and colleges; in other words, we have not such a person as a "sanitarian" in the same sense as we have a "physician" or a "counsellor". Another drawback is the political one. Applied sanitation being effected through Boards of Health, and the latter being appointed by politicians, the result is not a rapid solution of sanitary problems in the individual towns.

Progress in the future must naturally be educative, and educative in the broadest sense of the word. There should be in our public schools teachers properly equipped, school books and reading lessons on sanitary topics, written by a practical sanitarian, and not by an emotionalist, giving information to the young on the values of cleanliness, methods of disease dissemination, care of ordinary foods, etc.

Boards of Education have a mighty problem in the sanitary care of the children and teachers, and although it has been recognized for many years that the growing susceptible child may and does breed deformity, disease and physical disaster in the school-room, still the Boards have been slow in controlling defects. The influence of this Association could be spent in no better way (though it may take the usual ten or twenty years to accomplish results) than to see that on every Board of Education there is at least one accepted sanitarian, who should have the power to in-

vestigate into school affairs and to demand betterment where same is found defective.

Good educative work is being done in the publication in the Annual Reports of the papers read at our meetings, together with the discussions on them. It is a question, which some of us have thought of solving, whether it would not be fairer to the writer and the public to give a broader dissemination of these papers than they now have. Arguments are good in favor of a periodical, either conducted solely by the Association, or in conjunction with the State Medical. Has this Association done all in its power to further sanitation if it fails to spread to the public, lay and professional, its wonderful fund of sanitary knowledge, which is being evolved yearly? I have sometimes felt that if we had a special committee on the distribution of sanitary knowledge, who would be expected to conduct lectures and demonstrations in different parts of the State, it might be made successful, and meet a strong need.

Every individual and every society should have an ideal, and our Association is strong enough in gray matter to accomplish anything it may attempt, whether it be a movement towards health-giving milk, or the suppression of tuberculosis, the extermination of flies or partisan politics in health boards.

In the words of Prof. J. Madison Watson, of Elizabeth, at the meeting of 1895, "The supreme lesson of sanitation is the need of absolute cleanliness in the State, in the community, in the school, and in the home—personal purity of the individual, clean within and clean without, ever conjoined with beneficent activities."

IDEAL DAIRYING.

BY R. A. PEARSON, PROFESSOR OF DAIRY INDUSTRY, NEW YORK STATE COLLEGE OF AGRICULTURE AT CORNELL UNIVERSITY.

I understand the subject of this paper to mean the condition of the milk-producing industry that we would like to see in vogue. My ideal, therefore, is practical. It refers to the great bulk of market milk and not to a dairy here and there whose trade is limited or whose owner can as well run it at a loss as a profit. I mean no criticism of certified milk or other such high-class dairies. They have their useful place, and they are increasing in importance, but they are beyond any ideal that we may expect to realize in the production of the great bulk of market milk for some years to come.

Milk production is an industry in which many thousand citizens are making their living. Its methods of conduct have been about the same for many years. It represents an investment of hundreds of millions of dollars. Radical changes cannot be made suddenly in such an enormous enterprise. For a present-day ideal I would describe conditions that are now to be found on some of the better dairy farms that are sending milk to the general market, and doing so *at a profit*. The fact that a dairyman must make a profit from his business is often overlooked. Many people seem to think he should be a philanthropist, or at least carry on his business at a loss.

The production of milk may be discussed conveniently under five headings, representing five distinct points that should be guarded. These are:

I. The health of the cow.

II. The cleanliness of the cow and her surroundings.

III. The condition of the utensils.

IV. The cleanliness of the employees (including their health).

V. Cooling and storing the milk.

I. Cows that produce milk for human food should be in good health. A competent dairyman can usually tell if a cow is not in good health, and he will recognize any of the common cow ailments except tuberculosis, and he should always withhold from the market any milk given by such a one. He should have a veterinarian pass upon the health of his herd at least once each year. The value of the tuberculin test is well known, and it should be used by a rapidly increasing number of dairymen. But it would be unwise, in my judgment, to compel its use in all dairies within a short time. There are not enough competent veterinarians to test all cows in a short period of time, nor are our laws so effective now that unreliable work and re-contamination can be sufficiently guarded against. Here is an instance where cow owners need to know the facts. When they understand the true value of tuberculin, and how its use may save them from heavy losses, as well as assure safer milk, they will want this test.

Measures for protecting the health of the herd include light and ventilation in the stables. Every stable should have an abundance of direct sunlight and fresh air. If dairymen understood the importance of these agents, new windows and ventilators would be installed at a rapid rate. It would be well if every dairyman knew the details of a carefully conducted experiment along these lines, which has shown the better results in a dairy where light and fresh air were abundant as compared with another where these aids to health were lacking.

II. The cow and her surroundings should be kept clean, and this requires intelligent labor or expert supervision. Wholesome milk cannot be produced in dirty places. Many producers are honest in their belief that a little foreign matter falling into milk does no harm if the milk is well strained. They do not know that organic matter is laden with objectionable types of bacteria, and these organisms constitute the chief harm, and that the soluble part of the contaminating material is next in importance, and the stuff that cannot get through the strainer is the least important. If dairymen did but appreciate what it means to plant a lot of bacteria in milk as well as they appreciate what it means to let a lot of weed seeds get into their fields, then it would be easier to enforce the simple rules of cleanliness.

It is not ncessary here to tell how to clean a cow or a stable, but these are the things of importance rather than the

breed of the cow or the cost of the stable. Some rich but misguided people have spent fortunes on prize-winning animals and fancy buildings, and yet are unable to produce good milk, because they or their employees do not know what it means to keep a clean diary. Unless one has studied the subject he will overlook many a point that seems trivial but is vital. The dust in the air is one of these. For good results special care must be taken to keep the air free from dust. It is very bad practice to brush cows just before milking, or to feed dry hay at that time. Loose ceilings and partitions are reseponsible for quantities of dust that are invariably found in too many stables. If dairymen knew the "raft theory" of Tyndall, by which the carriage of bacteria on particles of dust floating in the air is made very plain, then it would be easy to reduce this objectionable condition.

My friend Prof. Esten, of the Connecticut Experiment Station, has conducted some very simple but interesting experiments, showing the contamination that may result when flies get into milk. He caught a number of flies in his house and placed them in sterile water, and thus washed many bacteria from them. The bacterial contents of the water was ascertained, and it was found that the flies contaminated the water at the rate of about three hundred thousand bacteria per fly. He then made a similar examination of flies from his stable, and found that these carried an average of about eight hundred thousand each. Flies from the pig pen were found to carry an average of about one million bacteria each, and those from the swill barrel about one and one-half million each. If dairymen really knew such facts as these they would be more willing and anxious to keep flies and dust out of their milk.

III. The kind of utensils used, and their care, are factors having much to do with the quality of milk. The chief trouble is in the lack of cleaning and sterilization. All utensils should be thoroughly cleaned and exposed to live steam or boiling hot water until practically sterile, and then cared for in a way to prevent further contamination.

Many persons merely rinse with warm water, which does little good, or they may sterilize the utensils carefully, then expose them to dust. Such defects are due more often to ignorance than wilful negligence. Frequently it is found that with the same amount or less work, better directed, much better results can be had. It is very important to avoid the use of contaminated water for any dairy work. Disease

germs have sometimes been transmitted to milk by impure water used for cleaning.

I must not omit mention of one utensil that is coming into use in the interest of ideal milk. It is the small-top milking pail. Most of the stable contamination finds its way into milk when the pail is under the udder. This can be largely excluded by reducing the size of the opening through which it falls. The common milking pail measures twelve or fourteen inches across the top, the larger size having an opening of 154 square inches. A ten-inch pail has an opening of 80 square inches, and a six-inch pail only 28 square inches. Many figures could be quoted to show the smaller number of bacteria when the small-top pail is used instead of the ordinary.

IV. The employees must, of course, be healthy. They should have clean hands, and wear clean overall suits when milking. It is found by experiment that a quiet milker gets cleaner milk than one who is rough and vigorously shakes the udder and surrounding parts.

V. Some would say that the cooling of the milk is the most important of all requirements. It is vital, but not more important than the other four headings. The milk should be cooled promptly to 50° F. or lower, and kept cold until delivery. Unless an exceptionally cold spring is available, every dairy which sends milk to the market should be provided with ice.

Very briefly I have given my idea of what should be ideal milk production for our cities and towns, but this is only half of the story. Good milk must be properly cared for after it leaves the hands of the producer, or its chief value is lost. We need ideal transportation and ideal delivery, which are to be discussed on this program. We need also ideal care of milk in the homes where milk is bought by the pint or the quart, and where much of the troubles charged against the dairymen have their origin.

And, again, we need purchasers who want ideal milk. For a moment look at this question from the dairyman's standpoint. Many dairymen are in position to ask, why they should exercise greater care, and increase expense of production (labor or closer attention to details is money), when they cannot improve their market one cent's worth by so doing. We need milk consumers and milk dealers who will show some appreciation of ideal milk. The saddest

and most astonishing exhibit of disregard of the fact that some milk may be better, and more wholesome, and worth more than other milk, is shown by most of our public institutions which buy milk. Especially are the hospitals remiss in this matter. It is the practice of most of them to buy the milk that is cheapest, without even the faintest sign of concern as to whether the milk comes from healthy cows, and is well handled, or not. Under such conditions where is the encouragement for the dairymen to produce ideal milk. I sometimes think the dairymen are more nearly ready to produce ideal milk than the public is to appreciate it.

Some would take the bull by the horns, and rigidly enforce laws. As to the enforcement of laws and ordinances requiring more sanitary conditions at dairies, we should not forget that the demand, which is beginning to show itself all over the country to-day, for cleaner streets, better water, better milk, and better sanitary conditions, is due very largely to knowledge of sanitary science that was not available until a few years ago. Some of us have acquired more or less of this knowledge, but the great majority of our population in cities and country is still relatively ignorant of what sanitary science means. And so certain sanitary requirements seem reasonable to us, because we understand what underlies them, and these same requirements may seem unreasonable and harsh to others, who do not understand them. Perhaps a few years ago, when we did not know as much as we know now, they would have seemed unreasonable to us. The point I want to make is this: Very many milk producers are just as honest as any citizens, and they are just as anxious to do what is right. They need instruction. A campaign of education is begun. It needs support. Every milk producer in the land should have an opportunity to learn the latest that is known concerning his business. Then many of them, especially if encouraged a little by the milk buyers, will make the desired improvements in their dairies, and the realization of ideal dairying will be at hand, and the necessity of enforcing laws will be reduced to a minimum.

IDEAL DAIRYING.

BY PROF. EDWARD B. VOORHEES, SC.D., NEW BRUNSWICK, N. J.

When a freshman in college, the first subject I had for an essay was "Is There an Objective Standard of Aesthetics?" That subject worried me a great deal at that time, and ever since whenever there is a difficult proposition presented to me I always think of how I had to rustle with that essay. The subject "Ideal Dairying" or "Ideal Milk," it seems to me, belongs in the same category; it is a difficult product to define. The trouble is that nature does not provide an ideal product, either in respect to its usefulness as a food or in respect to its possible influence upon the health of the consumer, besides, with the complications and varying conditions which come with the advance of civilization, the ideal standard becomes much more involved. It is much simpler to have an ideal flour, first, because of its practical stability in composition, and, second, because there is not so wide a variety of uses. The same is true, though in a different degree, in reference to the various meats that are purchased; one has an opportunity of choosing that which, in his judgment, is best adapted for his purpose. In the case of milk there are so many conditions that enter in, so many points of view from which it may be considered, that it makes helpful discussion of the subject very difficult. There are so many phases, any one of which may be correct so far as it goes, but too often those holding one do not recognize the others, or, if they do, do not give them due consideration. A few assumed cases will make this point clear.

For example, a physician who has made a study of milk as an article of diet, but has not studied it in reference to its contamination by dead and living matter, has a standard of quality which takes into account only the proportions of the various nutritious compounds; it must contain certain proportions and amounts of fats and of solids not fat. He has not made such a study of the physiological or nutritive values of other kinds, nor is he able to select any special

product as being superior to another, except he believes that there should be these relationships. The bacteriologist, on the other hand, while not ignoring nutritive value, is influenced in his formation of an ideal by the possibilities of contamination, and unless he knows positively that there has been no possible entrance of noxious germs into the milk, either through the food, the animal herself, or by the subsequent handling of the milk, he discards the milk as of doubtful value. His standard of quality is the number of bacteria in a c. c.

The food expert, so called, for many (perhaps most) are not expert, is governed in his judgment largely by the condition that the product is in when it is consumed. He has regard both to the methods which have been used in its production and its quality from the nutritive standpoint. If any portion has been removed, it is, in his judgment, not a balanced food, and, therefore, is not ideal, or if it has been produced under such conditions as to very materially increase the fat content in relation to the solids not fat, he insists that in order to make it an ideal food product it must be modified by the removal of part of the fat, and the possible addition of albuminous substances.

The milk dealer is another very important factor in the matter of ideal milk; he makes, in many instances, the ideal to suit his ideas of what the consumer should have at so much per quart. A milk containing 15 per cent. of total solids, of which 6 to 7 per cent. is fat, is altogether too rich for the blood of the consumer, though he is not governed to such an extent by this excess of nutrients as to pay the producer pro rata for its quality, but rather mixes it with milk from other producers, the composition of which is so near the legal standard that he is able to obtain it for a much lower price than he pays on the average, and the modified ideal enables him to fix the price at a profit to himself. The ideal milk to him is that which he can sell at the highest price without complaint on the part of his customers.

The ideal milk of the intelligent, up-to-date dairyman is that which he can produce from healthy cows, fed healthy food, kept in clean barns and carefully handled after it is produced. He knows that milk varies in its composition and quality; the first due both to the kind of animal that produced it, the time of year that it is produced and the methods used in handling it; and the second to the vigor and health of the cow and the care of both the cow and her

product. He is, therefore, reasonaoly careful in all of the processes to make it healthful and nutritious, and to prevent any injurious quality entering into it after it is drawn. He knows, too, that if he makes this kind of a product that it costs him more per quart than if he did not observe certain rules in its production and care; he is an honest man, desires to make good milk, and is willing to exercise due diligence to accomplish his purpose. The average dairyman, too, has a standard, though a much lower one; he does not know much about what causes the changes in the composition and quality of milk; he knows that there is a certain distinction between what may be called "butter breeds" and "milk breeds" of cows, and knows, also, that any herd has to be well fed if it is to produce a good yield of milk, but he has no other standard than that it will sell readily in the market.

The poor dairyman also has an ideal, though he may not have so formulated it in his mind; to him cows are cows and milk is milk. He knows no distinctions either in reference to composition or quality, and cares less. He is not really a dairyman in the sense that he understands his business, but, because he is in the majority and has this low ideal, the few and better ones, who have a higher standard, must suffer. In other words, the fact that this man is not careful in reference to his selection of animals and their health, their stabling, their cleansing, or in reference to their food or the handling of the milk afterward, the milk is liable to be (though not necessarily) poor as a food product. His milk, however, goes to the same dealers as the milk of the good or the average dairyman; the dealers make no distinctions, unless it is absolutely bad, and, hence, it is mixed in and frequently contaminates the whole. Inspections conducted by intelligent men are apt to be influenced more by this poor ideal than by the ideal of the good dairyman.

The "educated consumer" (so called) is also one whose ideal has to be reckoned with; his education, in many instances, has been derived from popular articles in magazines, and his main idea is that bacteria are dangerous, and that the chief source of contamination is in the farmer's barn and dairy. He insists upon having vessels sterilized, and is not satisfied to receive his product in the producer's bottle, which is liable to carry germs from the dairy and from other homes to his own, but must have the milk, when delivered, put in

his own vessels at his house; when he can accomplish this he rests in supreme satisfaction, not knowing that the milk, when delivered, is left in an open can in the areaway of his house for two or three hours in the morning, subject to all the dust that blows, all the odors that permeate the basement; that the stray dog and cat get their portions, and that when Mary Ann takes it in she removes a little of the milk on the surface, hoping thereby to make it look clean to her master, though in its consumption he is absorbing cupsful of germs of all sorts, probably worse than any that are liable to be found in a well-conducted dairy. He sees but one side, and is a thorn in the flesh of both the true sanitarian and the good producer.

The intelligent consumer also has ideals, and they are reasonable ones; he knows that dirt is liable to be the chief contamination, and that this can be prevented provided the barns and animals are kept clean and the milkers are clean and healthy. He also knows that to make milk clean and healthful it costs more than to produce it in a dairy where these conditions do not prevail, and is willing to pay a better price, knowing that even at 12 cents per quart it is manifestly the cheapest source of nutrients. The indifferent consumer is one who, on the other hand, regards milk in its natural state as a standard; it all looks alike to him. He knows nothing of its possible dangers; his source of supply does not interest him, and he is satisfied provided he is able to obtain it at a low price per quart.

These are practical conditions which the producer has to meet. There is also an ideal in the minds of many who are impressed with the dangers of all bacteria; they look upon milk as the only or chief source of all human diseases, and feel in their own minds that raw milk, even though produced under the best conditions of management, is dangerous, and insist that not only all utensils used in the handling of the milk but the milk itself shall be sterilized, without regard to the effect upon the food value.

Such an ideal encourages the careless producer, because by sterilization all introduced matter remains, and is liable to be a source of infection. It is a question of expediency rather than any other which influences the formation of these ideals, because it is recognized that to produce clean, healthful milk is a costly process, and the average consumer is not interested enough to pay the extra cost; therefore, dangers to health will be reduced if all milk is pasteurized

or sterilized. Perhaps in the present chaotic condition this view is a practical one.

We also have the standard or ideal of State governments, which virtually regard as criminals any producers who put on the market milk which does not contain 12 per cent. or more of total solids, disregarding the fact that milk from which any portion thereof may have been removed may still be a cheap, useful and healthful source of food supplies; thus they eliminate from the trade skimmilk and buttermilk, disregarding also the fact that the natural product may be perfectly pure, so far as added substances are concerned, even though it contains a less percentage than the standard so fixed.

There are also the ideals of the manufacturers of dairy products. The butter-maker or the creameryman bases his values entirely upon the amount of butter that may be made from a given amount of milk, and the quality of the cream. He demands that only certain classes of feed shall be used, because one class will have a tendency to make the butter too soft, another to make it too hard, or still another to contribute undesirable flavors; discrimination must be made in the matter of feeds, resulting in an increased cost. The manufacturers of condensed milk also have an ideal, largely derived from arbitrary considerations, and will purchase milk produced only from certain groups of feed, thus making the cost to the maker much greater.

All of these ideals may be proper ones as far as they go, but they are all based on either narrow view points, misconception or ignorance, which certainly increase the difficulties of adjusting the business in such a way as to render milk as useful as it might be made, and to encourage the producer to use due precautions in its production. There is no question but that there should be a proper control exercised in the production, handling and sale of milk; the reasons for it are found on the one hand in the adaptability of raw milk as a food, and its high degree of usefulness, because of the high quality of the nutrients contained in it, and on the other, because of its extreme liability, in the process of milking and handling, due both to its fluid character and other physical properties, to be contaminated with germ-laden dirt, dust and water, and when foreign matters are introduced they contribute not only undesirable flavors and odors, but the milk is an excellent medium for the development of

the various organisms, disease and otherwise, associated with them.

The man who knows the value of milk from its various standpoints, and is also familiar with the processes that are necessary to adopt, in order to prevent the danger that is liable to follow from its careless production, and puts these ideas into practice, is liable to be called a "faddist," and I think that this view is due to the fact that if all proper precautions are taken the milk would cost much more than the consumer is willing to pay. He is only a faddist when he goes to extremes in the matter of the selection of animals, erection of buildings, purchase of utensils, care in milking and in the handling of the product. There is no use or sense in a great many of the means that are now used for producing what is called "sanitary milk;" it can be produced without a very great increase in cost over the ordinary methods, and it is only when all concerned can agree upon reasonable methods that it will be possible for the various parties whom I have mentioned to come to a correct understanding. I shall, therefore, take up the question from the producer's and business man's standpoint, and shall present only those phases of the question with which I am practically familiar, and point out as fully as may be the causes of the misunderstandings that now exist, and which are causing unnecessary friction.

I believe that the whole question of clean and healthful milk is very largely a commercial one, and because of this fact demands are made by those who do not understand that side, which cannot be met under present commercial conditions. In the first place, rules and regulations have been adopted by sanitary boards which in many instances are excessively rigid, while in others perfectly fair, but their execution is placed in the hands of ignorant and tactless officers, who antagonize even those who would be willing to make changes in their methods, if properly approached. Farmers are willing to make the necessary improvements if they can be assured of pay for their extra labor. In the second place, it is not as clearly understood as it should be, especially by professional men, who have had no practical experience in producing milk, that it is not a standard food product; that it varies in its composition, according to the breed of animals producing it, the period of lactation during which it is produced and the time that it is drawn. Milk

will vary from 9 to 19 per cent. total solids, under normal conditions, and under abnormal conditions (but which do not injuriously affect its quality) a wider range is still possible; it will range in fat from 2 to 12 per cent. under normal conditions, and still wider variations are observed under abnormal conditions. It is, in fact, a most difficult thing to secure a reasonably uniform product continuously, even in a herd of cattle of the same breed, because of the variations in composition due to differences in individual animals and to different periods of lactation. To do so requires constant attention, both in milking and handling, in order that the uniform standard may be maintained.

In experiments that were conducted by the New Jersey Experiment Station, and concluded in 1890, in which five of the leading dairy breeds were tested to determine the variations that might exist in the composition of the milk of the different distinct breeds, as well as the variations under natural conditions common to all, and their comparative yields, the results (which have since been confirmed in many other experiments) showed that there was a very wide divergence in the composition of the milk of the different breeds, and that the yield bore a distinct relation to the composition. On the basis of milk production the five representative dairy breeds were classified into three groups: the Guernseys and Jerseys in one, Ayrshires and Shorthorns in another, and the Holsteins in the third; in the first group (Guernseys and Jerseys) the milk averaged 14.60 per cent. total solids and 5 per cent. fat; in the second group (Ayrshires and Shorthorns) showing 12.70 per cent. of total solids and 3.75 per cent. fat, and in the third group (Holsteins) 12.20 per cent. total solids and 3.60 per cent. of fat. The yields of milk corresponded with the percentage of solids and fat, the higher the percentage of these the lower the yield. In the case of the Holsteins the average yield per day was greater than in the case of the second and third classes, and, as a natural correlary to this relationship, the milk containing the lowest percentage of solids and fat cost less to produce.

These facts may not be new to anyone here, though they have had a most important bearing upon the milk produced and sold for direct consumption, particularly as restrictions have been placed upon the production of milk in the way of care and handling, and as prices of feeds and other expenses have increased greatly. The natural tendency of the dairy-

man has been (where he has been obliged to sell in the open market, and for direct consumption), to produce that which costs him the least per quart. The quart basis, rather than the total nutritive value has been the measure of value, and has resulted in giving, on the whole, a lower quality of milk in this respect than would have been the case if the market price had borne some relation to nutritive values.

In the case of milk that has been sold for butter or cheese making, prices have had a closer relation to values, because the object in butter making is to obtain fat, and because fat is the most variable of the groups of substances in milk; when milk is paid for on the fat basis, it has had a tendency to encourage the use of that breed of cows which shows in its milk the highest content of fat. That is, even though the cost per quart is greater, the price paid for the product bears some relation to its composition. In connection with this, too, has come the better knowledge in reference to milk as a cheap, healthful food, and in order that it may fully perform its functions in this respect, much greater care must be exercised in its production than heretofore, and this has reference to milk of all of the classes here mentioned, whether rich or poor in nutrients. That is, a careful supervision must be made, first, of the health of the animals, using only those that are free from disease or injury; using feeds that can contribute no undesirable qualities to the milk, even though from a nutritive standpoint quite as good, and from a commercial standpoint much cheaper; the separation of the dairy barns from storage barns, which requires a more expensive construction per cow, because of the expensive material used in it, and the greater air-space required; the extra labor needed in the care of the cow, requiring careful cleansing, washing and special uniforms for milking; the use of expensive utensils; the necessity for a greater amount of heat for the necessary sterilizing of utensile and bottles, all of which adds materially to the cost of a quart of milk of whatever quality, and this is especially true now, when the greatest attempts, and proper ones, are being made to improve the quality of the product from the standpoint of the public health, because all materials and labor, feed and animals, cost very much more than years ago, when the prices to the producer were practically the same as they were up to the beginning of the present year.

I have made a careful study of the commercial side of this proposition. I realize quite as fully as anyone can (having

been in close touch with all phases of the work tor twenty-five years), the importance of making a perfectly sanitary product, but I realize quite as fully that if a sanitary product is to be put upon the market, possessing all of the original nutritive qualities, there must be a very considerable change of view in respect to prices paid on the part of those who are holding up ideals as to what milk should be. I have, therefore, prepared financial statements, showing the cost of milk per quart under three methods of production: (1) the methods of the man who is impressed with the necessity of having everything perfect, so far as all of the processes in the production are concerned—this statement is not extravagant, except in a few particulars, and can be verified in every particular, although the cost is beyond that which is absolutely essential; (2) the second statement represents the practice of the intelligent and progressive producer, who realizes, quite as fully as the first, the importance of cleanliness, health of animals, etc., but who is more practical in all of his operations; (3) the third statement is that of the careless producer, who represents quite a large number.

STATEMENT No. 1.

Investment.

Farm, 100 acres,	$7,500 00
Dairy barn (stable),	5,000 00
Dairy barn (storage),	3,000 00
Dairy house or creamery,	2,500 00
Tools and implements,	1,500 00
Dairy apparatus,	1,500 00
Horses (three teams at $500),	1,500 00
Cows (40 at $75),	3,000 00
One bull,	.100 00
Total,	$25,600 00

Annual Running Expenses.

Labor, four men in dairy barns, at $500 per year,	$2,000 00
Labor, one man and one boy in dairy, per year,	750 00
Labor, two men, with teams,	1,000 00
Depreciation in value of cows, 10 per cent.,	310 00
Depreciation in value of horses, 10 per cent.,	150 00
Depreciation in value of tools, implements and apparatus,.	300 00
Taxes, insurance and repairs to buildings,	200 00
One-half the cost of feed,	1,950 00
Total,	$6,660 00
Interest on capital, at 5 per cent.,	1,280 00
	$7,940 00
Manager's salary,	1,000 00
Total annual expenses, including interest,	$8,940 00

As before stated, the items herewith can be verified in fact. The yield of milk for the herd I have estimated to be at the rate of 7,500 pounds of milk per cow, or a total of 300,000 pounds from 40 cows. This estimate is based upon the average results obtained in many first-class herds, and it is probably only reached by a very few, thus giving the benefit of the doubt in this particular. The item in reference to cost of feeds may be questioned, as it seems that over $90 per cow is pretty high, but this can be proved by the actual costs of feeds at the present time. The retail quotations received last week were as follows: Oats, $40 per ton; wheat bran, $30 per ton; corn meal, $30 per ton; good sweet hay, $20 per ton; silage I have estimated at $5 per ton (one of the cheapest of the feeds used). Those persons, who are strenuous in the matter of feeds, claim that milk produced from by-product feeds or corn silage cannot be as good as that made from whole grains and natural or cultivated grasses. This point I shall not discuss for the moment; I have not accepted the theory in toto, but have used in these rations what are accepted as the best, viz.: one-third each, ground oats, ground corn, wheat bran, together with five pounds of good sweet hay and thirty pounds of well matured and well preserved silage.

In experiments that have been conducted at the New Jersey Station for the past ten years, with a large number of cows of different breeds, it has been shown that animals that produce as much as 7,500 pounds of milk per year, must be fed on the average for the 365 days at least nine pounds of mixed feeds per day, with the roughage here mentioned, and a simple calculation will show that this ration will cost 27.5 cents, and I have charged up but one-half of the cost of feed, the remainder being the amount produced on the farm. The total cost, therefore, of 300,000 pounds of milk at the farm, ready for transportation, is $8,940, at the rate of $2.98 per hundred, or 6.55 cents per quart. If the man is satisfied to carry on his business just for the fun of it, and does not charge interest on his capital invested, then the cost would be reduced to 5.6 cents per quart. If he is so delighted as to be willing to manage the whole business, getting up in the morning at 4:30 o'clock, and remaining up and at work until 8:30 or 9:00 o'clock at night, including Sundays (as he would have to), just for the fun of it, and thus the cost of the manager's salary is deducted, it still costs $2.22 per hundred or 4.88

cents per quart. One of the largest milk dealers in New York City made the following statement in a prominent New York daily last week, in reference to the milk question, and the necessity for an increase of one cent per quart in the selling price: "We have been paying the farmers 3.5 to 4 cents for milk, and after the first of October we will have to pay 4 to 4.5 cents. It costs a cent a bottle freight to bring it from the farm to the city; it costs ½ cent for cleaning, filling and icing it; it costs another ⅛ cent per bottle to haul it from the depot to the wholesale house. That means that it costs 6.25 cents to put milk upon the delivery wagon; out of the balance of 8 cents received, we have to pay drivers, inspectors and pay other expenses. There is really little or no money in the milk business."

"Little or no money in the milk business" for the dealer, when he can buy it for 4.5 cents per quart? How much money is there in it for the producer, when he sells it for 4.5 cents per quart, when it costs him, without interest on his investment, without experienced supervision, 4.88 cents per quart? This does seem to be unreasonable. Then let us cut out the faddist, and look at the matter in a more practical way. Here is the practical man, with his financial statement; he is intelligent, willing to do the best he can, anxious to make a living, and not at the expense of someone else:

STATEMENT No. 2.

Investment.

Farm, 100 acres,	$7,500 00
Dairy barn,	1,000 00
Dairy house,	1,000 00
Dairy apparatus,	500 00
Tools and implements,	1,500 00
Horses (three teams),	1,500 00
Cows (40 at $75),	3,000 00
One bull,	100 00
Total,	$16,100 00

Annual Running Expenses.

Labor, three men, at $500, in barns,	$1,500 00
Labor, one man and boy in dairy,	750 00
Labor, two men (with teams),	1,000 00
Depreciation in value of cows, 10 per cent.,	310 00
Depreciation in value of horses, 10 per cent.,	150 00
Depreciation in value of tools, implements and apparatus,	200 00
Taxes, insurance and depreciation in buildings,	150 00
One-half cost of feed,	1,720 00
Total,	$5,780 00

Interest on capital, at 5 per cent.,	805 00
Total annual expenses, including interest,	$6,585 00

In this statement, the cost of buildings is very much reduced; he thinks (and rightly) that he can make quite as good milk with less expensive buildings. He also feels that one man should take care of, milk and feed more than ten cows; hence his labor expense is also very considerably reduced—his cattle, horses, tools and implements, costing the same as in the first case, and could not be reduced. Furthermore, he is satisfied, in the matter of feeds, that many valuable by-products can be used without detriment to the quality or usefulness of the milk made, and that they can be used, also, without injury to the health of the animals. His cost of fine feeds is very considerably reduced, and is quite as low as it is now possible to make the rations. He regards himself as a full hand, and no charges are made for cost of supervision. His interest charges are very much less than in the other case, because of the reduced cost of his buildings and equipment, but with the same high production as in No. 1, viz: 300,000 pounds per year; it costs $2.20 per hundred, or 4.83 cents per quart. If he is satisfied to invest $16,100 in a farm, and to take the $500 per year (the regular wages of a good man) for the interest on the investment and for his labor, the cost is reduced to $1.926 per hundred, or 4.34 cents per quart. This magnanimous dealer, who must increase the price to the farmer from 3.5 to 4.5 cents, presents golden opportunities for money making to the intelligent and practical business farmers; but you still doubt, you say milk cannot cost that. Then let us take the third financial statement, representing the careless producer.

Statement No. 3.

Investment.

Farm, 100 acres,	$5,000 00
Tools and implements,	1,000 00
Dairy apparatus,	100 00
Horses, two teams, at $300,	600 00
Horses, one runabout horse,	100 00
Cows, 40 at $50,	2,000 00
One bull,	50 00
Total,	$8,850 00

Annual Running Expenses.

Labor, three men, at $400,	$1,200 00
Labor, one boy, at $175,	175 00
Depreciation in value of cows, at 10 per cent.,	205 00
Depreciation in value of horses, at 10 per cent.,	70 00
Tools, implements and apparatus,	110 00
Feeds purchased,	700 00
Taxes, insurance and depreciation in buildings,	100 00
	$2,560 00
Interest on capital, at 5 per cent.,	442 50
	$3,002 50

He buys a cheap farm, cheap tools and implements, has but little dairy apparatus, is satisfied with cheap cows and cheap horses, cheap labor, and buys cheap feed, besides he does not feed them enough, and yet with all of this, because he has cheap cows and cheap labor, he realizes a very much lower product per cow, although I have credited him with an average yield per cow higher than for many dairy States, namely, 3,500 pounds, and even at that his milk costs $2.14 per hundred, or 4.7 cents per quart. Cheap farms, cheap equipment, cheap labor and cheap cows and careless management does not result in lowering the cost.

If dairy farming is going to pay at the present demands for high quality, then there is abundant evidence that the price per quart must be increased. You may say that the farm should produce a great deal more than enough to feed forty cows, and that, therefore, there should be income from other sources. In making the statement I have assumed the best farm management, where forage crops and silage serve in the place of pasture. If the cows were pastured, as many believe is the more sanitary method of handling, the expense would be greatly increased, both in the matter of investment and running expenses. If the cows were pastured for six months of the year, it would require 100 acres, as the average number of acres per cow for good pasture is not less than two and one-half, hence there would be no land left for growing feed for horses or even for cows for both summer and winter. One hundred acres properly managed will produce at least one-half the feed that is required for the cows, all the feed for the horses, and probably, if carefully handled, might produce some fruit and vegetables and extra grain for sale, but the amounts must be necessarily small. The only income, positive and definite, in addition to the milk, is the calves that may be produced,

and in most dairies, unfortunately, these calves are sold as "bobs" for $1.00 to $2.00 each, an income so small as to not materially modify the cost per quart of milk.

I am safe in saying that if this matter were presented to business men as a purely business proposition, they would not touch it except the market price for milk showed a very considerable margin over the price I have fixed here as the cost per quart. Too many farmers, even under good management, are making some other department of the farm make up for the losses in the dairy, and while they know this, they are living with the hope that times will change; that consumers will understand the situation and wll be willing to pay the higher price that a quart of milk costs, knowing that even at the higher price of 10 or 12 cents per quart milk is the cheapest source of digestible nutrients on the market to-day, and not only the cheapest but the best that can possibly be used.

I present this, therefore, as the appeal from the practical business milk producers, in order that in all your deliberations and in all your recommendations for improving the quality of milk that along with it you urge upon the consumer the necessity of paying the higher price if he expects to get the better quality, for no business will develop along right lines or succeed when there is not a chance for a reasonable margin of profit.

THE IDEAL MILK OF THE FUTURE—MUNICIPAL CONTROL.

BY THOMAS DARLINGTON, M.D., COMMISSIONER OF HEALTH, NEW YORK CITY.

Ideal milk is pure milk, and pure milk is milk that is drawn from a perfectly healthy and normal cow, housed in comfortable and sanitary quarters, milked by a clean and healthy person into a sterile container, quickly cooled and transmitted and delivered to the consumer in a sealed package.

Ideal control of the milk supply consists of the strict supervision over the milk from the time it is milked until it reaches the consumer; in fact, every detail of its production, handling, shipping, sale and care in the household. Such an inspection is now made by the Department of Health of New York City, and in discussing the question of the ideal control of the milk supply I cannot do better than to refer to the method of inspection of this Department of Health and the results that we have obtained.

In dealing with the question the first point to determine is as to the responsibility for safeguarding the milk supply of any given community. Throughout the rural districts the State should have undisputed control, but in cities of any considerable size, where the supply of milk is drawn from long distances, and where the question of transportation enters largely into the problem, it is essential that the city or community should have the power to determine the conditions under which milk intended for sale within its limits shall be produced. As an example, New York City draws its milk supply from 35,000 dairies and 700 creameries. These are situated in six States, New York, New Jersey, Pennsylvania, Connecticut, Massachusetts and Vermont. Some of the milk is brought as far as four hundred miles, while the shortest hauling distance from a creamery to the city is twenty-five miles. It will thus be seen that the government and laws of six States would have to be con-

sidered by the city in determining whether or not the milk supply came up to the civic standard.

New York City has no direct authority over these various farms and creameries, but it has the right to determine the quality of the milk sold within its limits, and, therefore, it has the right to prescribe to these producing points exact regulations for cleanliness, hygiene and sanitation, and if these regulations are not complied with, it has the right to exclude from the city the sale of milk produced at that particular point. The question of a pure milk supply therein differs from that of food adulteration in general. The latter question can be met by the Federal authorities to a large extent through its laws on Inter-State Commerce, but milk, from its very characteristics, is so perishable an article of food that its safeguarding can at present be safely dealt with only by local authorities.

This question must be looked at from two points of view: that of the present state of affairs, and the possibilities of the future. It is a matter of education not only of the public, but of the governing power. Until this education has reached the point where it is possible to have absolute co-operation between the States, or uniform regulations by the Federal government, it would seem to be necessary for the cities to control their own supply of milk. We should, however, look forward to the time when this will be done by the State authorities, for communities should not be put to the trouble and expense involved in making inspections of dairies and farms throughout rural communities and situated in outlying cities. This must, in time, be a function of the State. At present, however, it is a problem to be met by local authorities.

The two main factors which influence and control the keeping qualities of milk are absolute cleanliness from the moment the milk is drawn from a healthy cow until such time as it is delivered into the hands of the consumer, and the second is the temperature at which the milk is kept during this period. If these conditions can be controlled and maintained, it is perfectly possible to insure a pure milk supply. In order to maintain these conditions the first requirement is systematic and constant inspection, and the second is the prevention of the sale of any milk which is unwholesome or adulterated.

There are seven links in the chain of the milk supply of a city, first, the dairy or farm where the milk is produced;

second, transportation from the dairy to the creamery or shipping station; third, handling at the shipping station; fourth, transportation from the creamery to the city; fifth, the transporting of the milk to wagons, which carry it to the retail stores; sixth, the retail store, and seventh, the household where the milk is used.

The ideal control consists of strict inspection over each link, and supervision over every condition that surrounds the production, handling, shipping and selling of milk. I do not wish to discuss the merits of pasteurization, as I believe that to be a matter of individual preference, but the aim and object of municipal control of the milk supply should be to insure to the city a supply of clean, unadulterated milk. Taking up the scheme of inspection more in detail, the first step necessarily comes at the farm or dairy where the milk is produced. Here the real work of reform must begin. The main points inquired into by the New York City Department of Health are that the barns and cows shall be kept clean; that there shall be proper drainage and sanitation of the barns and yards; that refuse shall be properly disposed of and not allowed to accumulate on the premises; that the cows shall be examined by a veterinary, and all those in whom disease is found to exist shall be eliminated from the herd; that the milking shall be carried on under cleanly and hygienic conditions; that all cases of contagious disease in the families of the proprietor or his helpers shall be immediately reported to the department of health; that the utensils, cans, etc., used in handling the milk shall be kept clean, and that the water supply of the farm shall be pure. In addition to this, it is required that the milk shall be transported from the farm to the creamery in closed, clean receptacles. If these conditions are not found to be complied with on reinspection, the milk from that particular farm is barred from sale in New York City. It is, in my opinion, unnecessary to have laws so stringent or severe that they practically prohibit the production of milk by the small farmer.

Inspections have now been made of all the farms and dairies sending milk to New York City, and the requirements of the health department have been observed in the majority of instances. Very few dealers have found the repairs or alterations so expensive or intricate that they were burdensome.

At the creamery the conditions existing are slightly different. Here at these shipping stations the milk from a large number of farms is handled, and on account of the smaller number of these places and their character it is possible to more strictly enforce the laws governing the care of milk. The principal requirements for the maintenance of a sanitary creamery are that it have an uncontaminated and ample water-supply; that there be an ample and satisfactory method of disposing of the drainage, and that all milk while being handled for bottling or canning, and while being stored in the creamery, be kept at such a temperature as to prevent the undue growth of bacteria, and that the milk be protected from the liability of contamination by flying particles of dust and dirt.

The complete rules and regulations of the Board of Health bearing upon this subject are of too great length to be read at this time. Their main purpose is, however, the maintenance of absolute cleanliness and good hygienic surroundings. At the time of inspection of the dairies and creameries all facts as to their condition are noted on specially prepared cards. These cards are then mailed to the central office in New York, where the proprietor of the dairy or creamery is notified of the changes to be made in order to make his place come within the requirements exacted by New York City.

The third link, that of the transportation from the creamery to the city, has not proved difficult of control. Here the main requisite is that the milk shall be kept properly cooled, and this can only be adequately done by means of regular refrigerator cars. The railroads transporting milk to New York City have met this requirement in a broad spirit of co-operation. Practically all of them have erected large ice-houses for the purpose of supplying their refrigerator cars with an ample amount of ice, and as a result the milk is now transported under excellent conditions, and the maximum temperature of 50° is almost universally maintained. This maximum degree is fixed by one of the sections of the sanitary code, and any milk above this temperature is deemed to be adulterated, as the bacteria above this temperature multiply with astonishing rapidity. If there be one particular point which must be emphasized in the care of milk, is that it must be kept properly iced, and because of the importance of this point, the next link in our chain,

second, transportation from the dairy to the creamery or shipping station; third, handling at the shipping station; fourth, transportation from the creamery to the city; fifth, the transporting of the milk to wagons, which carry it to the retail stores; sixth, the retail store, and seventh, the household where the milk is used.

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that of transporting the milk from the train to the retail store, is, perhaps, the weakest of all.

It is a time when alert watchfulness is needed, and it is our practice in New York City to have inspectors meet the incoming trains and boats, and test the temperature of the milk whenever it seems possible that it is higher than the law allows. All milk thus found, not coming up to the standard required, is immediately confiscated and poured out into the gutters or the river.

Milk should be properly iced while on the wagons, but this is a problem that has not yet been thoroughly solved. Conditions, however, are rapidly improving, and as a matter of fact practically all of the milk in New York City reaches the retail store in as pure a condition as it started from the farm.

The problem of the retail store is one more easily controlled. No stores should be allowed to keep or sell milk without a permit from the local authorities of the city. In New York City there are over 14,000 dealers holding such permits, and, before the granting of each one, a thorough inspection has been made of the premises, to determine the sanitary conditions. The rules regarding this matter are stringent, and comprise not only the sanitary condition of the premises, but the absolute cleanliness of the can in which the milk is kept, the dipper used for ladling, and the fact that it must be kept covered and properly iced. In order to enforce these requirements, it is essential that constant reinspections be made. The fact that the milk, at any time, shows a temperature above 50° F., is sufficient excuse for its confiscation. In order to determine its ratio of fats, solids and fluids, it is, however, necessary to resort to more intricate processes, and for this purpose samples should be taken frequently and submitted for analysis. Doubtful specimens should be also subjected to a bacterial count. It has not, however, been deemed advisable to establish a standard as to the number of allowable bacteria in a cubic centimetre of milk. The futility of this procedure may be readily seen, when it is realized that it is no indication as to the quality of the milk. If the standard be maintained, a dealer might be prevented from selling milk of the very first quality, simply because he had at that particular time kept it a little too long, or not properly iced, whereas milk, watered or otherwise adulterated, might show a low bacterial count.

It has, therefore, not been deemed wise to use this standard, and no such requirement is enforced in New York City. Violation of the law regarding the sale of milk is a misdemeanor; arrests are made in these cases, and conviction usually results in a fine. At the second offense, the Department revoke's the dealer's permit.

The next and last link in the chain, that of the care of milk in the home, would seem to be hardly a subject in which the sanitary authorities should be concerned. In fact, the care here is rather a matter of education than of individual or municipal control. When, however, it is realized a large proportion of the diarrhœal diseases of infancy may be caused by the ingestion of impure milk, it would seem to be a proper matter to be met by the health authorities, and particularly during the summer months this oversight is needed. In New York City, the Department of Health has carried on a campaign of education in this regard for many years. Its summer corps, which consists of physicians appointed for the particular purpose of prevention of the diarrhœal diseases of infancy, is busily engaged through the heated term in instructing mothers of babies how to care for the milk, and how to prepare it for proper feeding of the baby.

The co-operation of a free ice fund is a valuable aid in such work. Charities like the Herald Free Ice Fund in New York have rendered valuable service in life saving. In this work the efforts of the municipal authorities must be persistent and continuous, in order to achieve the desired result. In New York City the death rate from diarrhœal diseases in infants has decreased from 28.86 in 1876 to 11.87 in 1906. This fact alone is sufficient evidence of the value of the supervision of the milk supply, and the education of the public as to the importance of its proper care and use. Since the system of inspection has been in force, the milk supply of New York City has been materially improved. Granting the premise that I have taken, that the function and responsibility of a municipality can be only to furnish to the citizens a supply of pure milk, then the question is simply one of expansion and possibly elaboration of detail. The main and fundamental facts are perfectly clear. Systematic inspection is an absolute necessity, and the maintenance of absolute cleanliness is a *sine qua non.*

Probably the last and best word that has been said on the subject of the ideal control of the milk supply, is that em-

bodied in the report of the Commission appointed by his Honor George B. McClellan, Mayor of New York City, to study and report on the best methods of milk inspection and control. Several of their conclusions are worth quoting:

First. That milk obtained from a healthy cow is always wholesome, and never a source of danger, if it is kept cool and uncontaminated.

Second. In regard to tuberculosis, the report states that the risk of transmitting tuberculosis through milk from cows to man is very slight, unless the disease in the cow is in an advanced form, or is present in the udder. Then this slight risk is considerably lessened when such milk is mixed, as it generally is, with that of healthy cows before it is sold. We believe that this danger has been greatly overestimated in the public mind, and that it can best be met by systematic inspection and condemnation of cows revealing tuberculosis on physical examination.

Third. To secure a good milk supply, it is of the first importance to educate the farmers regarding the measures which alone make this result possible, and afterwards to see that the rules relating thereto are carried out, since for the most part the contaminating agents, which render milk dangerous, are introduced at the farms. The production of a good milk demands that the farmers be educated so as to secure this result, and also that the proper surveillance be exercised.

In regard to bovine tuberculosis, I wish to state that, in my opinion, this is a question which should be dealt with by the State and not by the municipal authorities. Regular inspection by trained veterinarians at stated intervals should be made at each farm. The mere presence of a tuberculosis lesion in the glands or lungs of a cow, does not necessarily render the milk infected, yet the difficulty in locating the exact extent of the lesions would render the absolute condemnation of all cattle diseased in this way imperative. Farmers should be recompensed for their loss in this regard, and, if this were done, it is probable that they would be willing and ready to ask for such inspection and supervision.

The City Division of Milk Inspections consists of sixteen inspectors, with one inspector in charge. It is their duty to see that all milk offered for sale has the proper amount of butter fat and total solids, and that the bacterial count is not excessive.

The amount of milk destroyed, arrests, trials, and fines collected in the last five years, are as follows:

	Milk Destroyed.	*Arrests.*	*Trials.*	*Fines.*
1902,	1,009	428	413	$10,490
1903,	176	76	...	1,100
1904,	33,160	408	406	7,340
1905,	39,613	789	806	16,435
1906,	41,395	678	644	13,045
	115,353	2,379	2,269	$48,410

IDEAL MILK AND SOME PHASES OF THE MILK QUESTION.

BY CLARENCE B. LANE, PH.D., ASSISTANT CHIEF DAIRY DIVISION, BUREAU OF ANIMAL INDUSTRY, WASHINGTON, D. C.

Ideal milk is the clean, fresh, natural product of a healthy cow. It has little flavor or odor, and, if kept clean, would never sour. Such a product, however, is rarely met with in the trade, and it is impractical to produce it. The nearest approach to ideal milk is what is commonly known as "Certified Milk," which is occasionally produced free from bacteria as determined by the ordinary laboratory methods. I have kept such milk for a period of five weeks at about freezing temperature without the product showing any signs of souring. In some instances where certified milk is produced one man is employed to every sixty quarts of the product. The stables are washed and scrubbed daily, and frequently disinfected. The whole body of the cow is groomed and bathed from the neck back, tails are washed, udders washed in sterile water in sterile pail and dried with sterile towel. The milkers take a shower bath before milking, and dress in sterile suits. Each pail of milk is taken to receiving room, strained through cheese cloth, run over cooler below 40°, bottled, capped, iced and shipped. Bacteria averaging below 1,000 per c. c. for a year. But I think we all agree that this is a little extreme, and that it is practically impossible to reach this ideal in the general milk

supply. At present about fifty dairies are aiming for this mark, and producing about 25,000 quarts of milk daily, which is only a fraction of a per cent. of the total milk consumption.

SAFE MILK.

What is needed is safe milk; that is, milk produced from healthy cows (tuberculin tested), under reasonably clean conditions (milk not exceeding 100,000 bacteria to the c. c., and free from dangerous forms) and handled at low temperature (not exceeding 50° F.) by healthy attendants. There are thousands of dairies producing this grade of milk, and they should be encouraged. There is a general feeling that the interests of the dairymen and of the general public are diametrically opposed to each other. This impression, I believe, is entirely erroneous. The dairymen wants a better demand and a better price for his milk. The most intelligent part of the public want clean, pure milk, and will pay a higher price if the increase is shown to be reasonable and necessary. This was well illustrated recently in one city where, through lectures and a crusade by the newspapers on the subject of milk, the consumers demanded clean milk, and it was up to the producers to supply it. At the same time, the consumers realized that the farmers could not afford to make the improvements that would be necessary to give them clean milk unless they charged more for their product, and, accordingly, when the raise came, they were, almost to a unit, willing to stand the increase on condition that the milk was made enough better to warrant it.

The demand for milk is far less than it should be, partly owing to its questionable cleanliness and partly because its real value as an economical food is not appreciated. The dairyman should aim to secure the confidence of the medical profession and the public. This would have a tendency to decrease the amount of condensed and other forms of milk, their places being taken by fresh milk. This principle is well illustrated by the packers, who objected to the meat inspection law on the ground that it would diminish the consumption of meat, and the disclosures showing bad practices did diminish the consumption at first, but it was only temporary. Now there is a rising market for all kinds of meat. Why? Simply because of the increased confidence of the consumers, owing to the more rigid inspection law. I mention this as an illustration to show that the enforcing of honesty and

purity in food products helps the producers. When the quality of food is raised, consumption is increased, and the consumer has more confidence. Poisonous preservatives help only the swindler who stands between the producer and the consumer. It is to the interest of the farmer and the dairymen to demand pure food laws.

The greatest supporter of oleomargarine is the dairyman who produces dirty milk and cream. Such farmers hinder dairy interests and the sale and consumption of dairy products. Before the pure food law went into effect the druggist diluted his chemicals; now he sells pure products, but no longer at the old price. The dairyman is in the same boat, and he must receive more money for a pure, safe product. The extra money required to keep the herd healthy, the barns clean and the equipment sterilized must eventually come out of the consumer's pocket. He must pay more for the product that has passed inspection than that he has been buying dipped from 40-quart cans and no questions asked. When he pays more, however, he has a right to insist that the milk be clean. Much of the milk sold in our cities is not worth more than present prices.

DIRTY MILK.

The greater portion of the milk delivered in our cities comes under this class. When we stop to think that milk produced with reasonable care contains from 50,000 to 100,000 bacteria, and that the average number of bacteria in the milk supplied to many of our cities contains close to a million to the c. c., cannot we say that the public has just cause to be alarmed. Out of some 3,000 dairies that have been rated on the basis of a score card, allowing 100 points for perfect, and which have come under my observation, the average score is about 45, not one-half as good as they ought to be. Many were in the 30's, a number in the 20's, and one rated only 7. Yet these were all selling milk for somebody to drink. It may be stated too that these dairies were rated in a score of cities in different sections of the country, showing that these bad conditions are not confined to one locality. We are a little inconsistent in the way we look at different foods. When milk is dirty we drink it (we can't see the dirt). When water is dirty we discard it. When 500 bacteria are found in milk it is certified; when the same number are found in water it is condemned.

MORE ATTENTION SHOULD BE GIVEN TO SANITATION.

I want to ask the question, is it not time more attention was given by our health officers to the sanitary condition of the milk? In addition to the question, how much water is there in milk, or how much fat does it contain? should we not ask how clean is it? or how many bacteria are present? There are several reasons why the cleanliness of the milk is more important than its composition. It is the germs that cause disease and sickness, and which are responsible for the thousands of deaths among the children of our cities every year. Too little attention has been given in the past to the healthfulness and safety of this most important food product. The harm of adding water to milk is very small compared with the results from the use of unclean milk, and yet in most of our cities the man who adds the water is severely punished, while the man who sells dirty, disease-producing milk escapes without any punishment. There are indications at the present time that such will not always be the case. Standards for bacteria are being established in our cities. Our National Pure Food Law provides that dirty milk can be prevented from entering into inter-state commerce. Our English cousins have set us a good example in this respect. At one place a recent act has put it within the power of any person who suffers from the use of dirty milk to recover damages from the person who sold it. Dairymen must then either produce clean milk or risk being ruined by prosecution. To prevent such prosecution from being successful it must be proven that necessary precautions have been taken by the producer all along the line. For example, the owner is required to exercise constant supervision over his cows, and if one is found to be ailing, it must be separated from the herd, and no milk therefrom sold for human consumption. The cows must be kept under healthy conditions; that is, the stables must be clean, lighted and ventilated. The stabling of cows in a stuffy, dirty, ill-ventilated and badly lighted building renders the owner liable to damages to any person becoming sick from the use of the milk. The milk must also be handled by healthy attendants and under proper conditions.

One active sanitarian across the water would go so far as to have the law altered rendering any person who sells milk from a diseased cow liable to a term of imprisonment, with hard labor and without the option of a fine; and if a

death could be traced to the use of such milk, the person proved culpable should be committed for manslaughter, and be liable to penal servitude for life. Perhaps this is putting it a little strong, but when we consider that about 5,600 children are born in the United States every day, and more than 1,400 die; that there is a death for each minute in the twenty-four hours, and that the principal causes of these deaths are diarrhœal diseases, and that the principal cause of diarrhœal disease is dirty milk, we have food for thought. We are too much disposed to look upon this enormous waste of money, energy and infant life as inevitable, or as a matter of course, and as a part of the natural order of things, but in this we are wrong. Many instances show that the death rate can be reduced twenty-five to fifty per cent. during the critical summer months by feeding the infants clean milk. The saddest thing of all about it is that this enormous sacrifice of infant life is, for the most part, unnecessary. If our cities were conducted on anything like the system of a well-conducted farm, there would be much less sacrifice of infant life. If our children were considered by the municipality to be worth as much as pure bred Jersey calves, this clean milk problem and feeding problem would have been solved long ago. We lose very few Jersey calves. Some one has said fewer children are born in the cities and more die there; as the cities grow the race dies.

We must admit that the milk supply is not satisfactory. The stables are not sanitary, the cows are diseased, the milkers have dirty habits, the milk is not properly cooled, the utensils are washed at the kitchen door in lukewarm water, and not much of it. As a result the milk is dirty. Dirt in milk is probably due more to ignorance than to wilful neglect. While many farmers are wilfully careless, this is not true of the majority.

The pure milk problem will not be solved merely by the improvement of the dairy farm. Transportation and distribution must be controlled by proper regulation. The treatment of the milk after the consumers get hold of it is also important. The open vessels set out for the milkman, and which are often exposed for hours to the dust of the street, often contribute more dust and contamination to the milk than the producer and dealer together. Some tests that have been made have shown that the contamination from one dish which was set out to receive the milk amounted to 184,000

bacteria per c. c., and yet the dairyman gets the blame for the milk going sour.

PACKAGES FOR MILK.

The delivery of milk in sealed bottles is a great improvement on the dippage system practiced in many of our cities. The price is but little, if any, higher than milk delivered in the old way, and the milk is cleaner by a quarter of a million bacteria to the cubic centimeter on the basis of the results obtained in Cleveland. That is, the average bacterial content of dipped milk was found to be 993,690 to the c.c., or nearly a million, while the bottled milk contained 725,611, a difference of 268,079 in favor of bottling. There are serious objections, however, to the use of bottles; they are heavy, have to be returned to the dairy to be cleaned, if not properly sterilized, they may serve as carriers of disease, and the original cost and expense due to losses and breakage is a big item. Many attempts have been made to manufacture a satisfactory paper bottle with the hope of minimizing this loss and lessening the danger of spreading disease, and there is some hope of its being brought about; up to the present time they have been in practical use but little.

CONSUMERS IMPOSED UPON.

Unfortunately, the consumer has but little opportunity to know the conditions under which the milk brought to his door daily is produced, and, as a rule, he is a poor judge of the quality of milk. If it shows a fair cream line, and is sweet that is about as far as the average consumer examines it. Under these conditions, it is comparatively easy for the dealer to misrepresent his product. To mention a case in point: I was called as a witness in a lawsuit, recently, between the State of Kentucky and a milk dealer, who was accused of labeling milk "certified" which was bottled out of the regular tank, containing ordinary mixed milk. This product was represented to the public as being the certified product from a high class dairy farm. What protection has the consumer? While the dealer was fined in this case $25 and costs, this did not help the scores of babies who were being fed this milk, with the belief that it was an absolutely pure product. Another case, that came up at the same time, was against a man who labelled his milk "Bottled at East-

wood," to make it appear to the public that it was fresh milk bottled in the country. What protection has the consumer? This man was fined $10 and costs. Still another case, against a man who had a filthy milk plant, where the waste water and waste milk ran down through the cracks in the plank floor, and never drained away. You can imagine the odors. The State Food Commissioner, who was with me, removed a pint of flies at this place from a can of cream, just before it went into the freezer. After being frozen, the cream was packed in cans that were very rusty, inside and out, and shipped to picnic grounds for the babies to eat. Then when the babies get sick, people wonder what's the matter. This man was fined $100, and given thirty days in jail. While there are many bad conditions that the law never reaches, it is a hopeful sign that the law is being applied to some of them. The following cases in an ordinance court, disposed of one afternoon recently, are noted: Mr. A., watered milk, $25; Mr. B., watered milk, $50; Mr. C., filthy milk, $10; Mr. D., filthy milk, $10. You see the watered milk cases received the heaviest fines. I think I should put it the other way.

THE REMEDY.

Laws must always be in force for the wilful law breaker, the careless, and the ignorant. The inspectors must deal with these with a firm hand. I have no patience with the persistently and wilfully dirty dairyman. It is natural that the dairy farmer should be suspicious of officialdom, but the public should not be denied the right to protect itself from disease, or from an impure product. Unnecessary interference should always be avoided. The real remedy for the rank and file of dairymen, in my opinion, is not inspection but instruction. The dairymen needs co-operation; he needs assistance; he needs encouragement; he needs to realize more fully the difficulties of the Health Department in keeping the milk supply pure, and appreciate the importance of it; then the differences would largely disappear. This instruction should be given right at the dairy farms, with the dairyman on the spot. It should be given by thoroughly capable and practical men, not by the class of men who were recently appointed to the inspection force in a western city, which consisted of a teamster, an engineer, a detective, a "solicitor," a machinist and an ex-policeman. A good example of what politics is doing for the govern-

ment of our cities. Now, we have colleges and dairy schools for training young men for just this work, and if they are not doing it they ought to, and if they are doing it, then there is no excuse for not securing such men for this work.

The score card, in connection with inspection and instruction work with the dairyman, is a great aid. Its advantages have been demonstrated in a score of cities, and it has been found helpful in the following ways:

(1) In giving the dairies a definite mathematical rating, which is much better than using general terms, as good, fair, bad, etc.

(2) In pointing out defects, and showing where improvements can be made, and often at little expense.

(3) The system gives little opportunity for favoritism, as each branch of the dairy has a definite number of points assigned to it.

(4) The system encourages confidence among dairymen in the inspection work, as they feel that they are all being treated alike.

(5) It encourages competition between dairymen for the best scores—as a result they take more pride in their work.

(6) It aids the dealers in finding the better dairies, and in grading the milk.

(7) It leads to greater profits. More attention is given to detail, and this is important to success in any business.

(8) It shows the consumer the rating of the dairy supplying him with milk, and gives him an opportunity to patronize the better dairies.

(9) It furnishes Boards of Health with an excellent system for keeping records of the conditions of dairies and milk plants, and in following the work of inspectors.

Some of these advantages are well illustrated in a report of the Health Officer of Montclair, N. J., in which he publishes for the benefit of producer, dealer and consumer, the average year's rating of every dairy supplying the town with milk, and, in addition to this, the average content of fat and solids in the milk, and the bacterial count of each dairy. This, to my mind, is approaching the ideal in milk inspection and control. As a result of this plan of procedure, the better dairies receive the best prices for their milk, and the dirty dairies have to accept a cent or two per quart less. This is as it should be. High prices for a high grade product, and any dairyman may enter the highest rank

just as soon as he is willing to spend the time and money necessary to put him there.

I believe the time is soon coming, in some of our cities, when the health authorities, dairy farmers, milk dealers and consumers will all work together for a wholesome milk supply. Such a working arrangement is not impossible at the present time in some of our cities. To accomplish this, the dirty dairies will need to be brought up to a reasonable sanitary condition, the health authorities asking for nothing unreasonable. The dairyman should be protected from unfair prosecution, and from the competition of dirty milk, which now sells for the same price as clean milk, in most instances. The interests of the public and the dairymen are one, and, just as soon as they can be made to see this, many of the present difficulties in the clean milk crusade will disappear.

PASTEURIZATION.

Pasteurization has not solved the problem of clean milk commercially, for the reason that it is expensive—requiring apparatus and labor; it is rarely done with sufficient care to render the milk safe; it does not take the filth out of the milk, and it tends to promote carelessness all along the line. Modern studies of milk tend to the exclusion of bacteria by cleanliness, rather than by destruction by heat, and show that dirty milk is death to babies and dangerous to man. Pasteurized milk is a fairly satisfactory substitute where clean milk cannot be obtained, and where the process is carried on under the direction of Boards of Health, it is reasonable safe.

The Milk Conference in Washington, appointed by the District Commissioners to report on the milk supply for that city, recommended that there be three grades of milk recognized by law, as follows:

Class I. Certified milk—to be produced under all conditions necessary to avoid infection. I will not attempt to outline these conditions here, further than to say that the cows must be tuberculin tested, and free from disease; that the milk must not exceed 50° when delivered to the consumer; that the water must be pure, as determined by chemical and bacteriological analysis; the milk must not contain more than 10,000 bacteria to the c.c., and must not be more than twelve hours old when delivered. This class of milk

to be certified by the Health Officer of the District of Columbia.

Class II. Inspected milk—to be limited to clean, raw milk from healthy cows, as determined by the tuberculin test and physical examination. The cows to be fed, watered, housed and milked under good conditions, but not necessarily equal to the conditions provided in Class I. The milk to be kept at a temperature not exceeding 50° until delivered to the consumer, and to contain not more than 100,000 bacteria to the cubic centimeter.

Class III. Pasteurized milk—to include all milk from dairies not able to comply with the requirements specified for Classes I and II, and to be pasteurized under the supervision of the Board of Health. This milk to be kept at all times at a temperature not exceeding 60° in transit to the pasteurizing plant, and at a temperature not exceeding 50° when delivered to the consumer. The cows must not show physical signs of tuberculosis, or any disease.

THE LIVES OF THE CHILDREN MOST IMPORTANT.

We may have gone too far, or been too radical, on some points in this milk question, but when it comes to preserving the lives of the infants, it is a question whether we have gone far enough. Their lives are hanging in the balance every day because of dirty milk. It is a crusade for the children, and if by any means we can lower the fearful death rate, who will refuse to lend their aid and give all possible assistance.

The basis upon which this question rests is hygienic economics. This lesson is being learned very rapidly at the present time. We are learning that bad air, bad water, bad sewering, bad housing, bad streets, bad milk, or bad food of any kind, are not cheap in the long run, and that in the end they prove a heavy expense to the individual and the community.

THE ANNUAL BANQUET.

Wednesday Evening, October 2d.

The Annual Banquet given at the Marlborough-Blenheim Hotel, Atlantic City, to the members of the American Public Health Association and the New Jersey Sanitary Association and the ladies accompanying them, was on a grand scale and with a large attendance. The menu was most excellent, and the postprandial speeches were much enjoyed, judging from the applause. The speakers were in order given: Dr. Domingo Orvananos, Mexico City (Pres. A. P. H. A.); Dr. Frederick Montizambert, Ottawa, Canada; Dr. William Bailey, Louisville, Ky.; Dr. D. C. English, New Brunswick, N. J.; Dr. G. K. Dickinson, Jersey city (Pres. N. J. S. A.); Dr. C. L. Wilbur, Lansing, Mich.; Gen. A. A. Woodhull, M. D.; Princeton, N. J.; Dr. R. L. Lewis, Raleigh, N. C.; Dr. H. W. Hill, Minneapolis, Minn. Prof. F. C. Robinson, of Bowdoin College, Brunswick, Maine, was the toastmaster, and he proved himself fully equal to the occasion.

A smoker and polite vaudeville entertainment was also provided for the ladies and gentlemen of both Associations by the New Jersey Sanitary Association on Thursday evening, October 3d, nine to twelve o'clock, at the American Garden, New York avenue and Boardwalk. Prof. H. B. Baldwin presented lantern slides.

Members of the Association.

Allenhurst—J. M. Ralston.

Arlington—John W. Griffin, James A. Exton, M.D., William J. Fink, D. V. S., C. F. Lochan, S. G. Hendren.

Asbury Park—T. Frank Appleby, T. H. Berringer, D. C. Bowen, Henry Mitchell, M.D., B. H. Obert, Randolph Ross, Jesse Minot.

Atlantic City—Edward Guion, M.D., A. M. Jordan, C.E., A. W. Bailey, M.D., Wm. F. Brode, J. Harper Carver, Wm. F. Cuthbert, E. S. Johnson, John J. Mahoney, W. LeRoy Somers, M.D., J. S. Wescott.

Bernardsville—L. E. Tuttle, M.D., Josiah Meigh, M.D.

Beverly—G. T. Tracy, M.D.

Bivalve—John Gaskill.

Bloomfield—Joseph C. Saile, Ph.G., D.V.S.

Bordentown—W. H. Shipps, M.D., Samuel E. Burr, John Virtue Rice, Jr.

Bound Brook—H. M. Herbert, C.E., Charles McNabb, F. H. Bent, Charles J. Merrill.

Bridgeton—J. Tomlinson, M.D.

Burlington—Shippen Wallace, Ph.D.

Caldwell—Morris B. Lindsley.

Camden—H. H. Davis, M.D., W. A. Davis, M.D., Henry B. Francis, John O. George, D.V.S., W. I. Kelchner, M.D., John F. Leavitt, M.D., R. H. Reeves, Daniel Strock, M.D., H. G. Taylor, M.D.

Demarest—William E. Davies.

Dover—William D. Griffen.

East Orange—T. N. Gray, M.D., Vernon L. Davey, Ph.D., George P. Olcott, C.E., C. C. Vermeule, C.E., W. H. VanWinkle, Roger H. Butterworth.

Elizabeth—Norton L. Wilson, M.D., Hon. E. S. Atwater, Louis L. Richards.

Englewood—Wm. C. Tucker, C.E.

Freehold—Alonzo Brower.

Grantwood—Guy Otis Brewster, M.D.

Gladstone—M. C. Smalley, M.D.

Hackensack—Hon. William M. Johnson, Fred S. Hallett.

Harrisburg, Pa.—F. Herbert Snow, C.E.

Hoboken—Graham M. Sinclair, Thomas H. McCann, C.E., E. T. Steadman, M.D., W. T. Kudlich, M.D.

Imlaystown—F. C. Price, M.D.

Jersey City—G. E. McLaughlin, M.D., Gordon K. Dickinson, M.D., E. W. Harrison, C.E., Ferdinand Sauer, M.D., Henry Spence, M.D., Henry Smellie, F. D. Gray, M.D., Boyd MacLean, F. E. Lambert, M.D., Frederick W. Cane, George T. Bouton, J. C. Parsons, M.D.

Kearny—Samuel Worthington.

Lakewood—V. M. Disbrow, M.D., I. H. Hance, M.D., Hon. William J. Harrison, George W. MacMillan, M.D., W. G. Schauffler, M.D.

Leonia—R. J. G. Wood.

Metuchen—A. Clark Hunt, M.D.

Midland Park—Joseph Payne, M.D.

Milburn—David E. English, M.D.

Millville—John W. Wade, M.D.

Montclair—Rudolph Herring, C.E., M. N. Baker, C.E., R. P. Francis, M.D., Edwin B. Goodell, Richard C. Newton, M.D., James Owen, C.E., John O'Brien, Jr., Chester H. Wells, Health Officer; Jay E. Kilpatrick.

Morristown—J. E. Taylor, John V. Laddey, D.V.S.

Morris Plains—Britton D. Evans, M.D., Peter Sandford Mallon, M.D.

Mt. Holly—R. H. Parsons, M.D., W. P. Melcher, M.D.

Newark—Nathan Myers, Arch., Morris R. Sherrerd, C.E., Herbert B. Baldwin, Ph.D., David D. Chandler, R. N. Connelly, M.D., Laban Dennis, M.D., W. S. Disbrow, M.D., H. C. H. Herold, M.D., Addison B. Poland, Ph.D., Harrison Van Duyne, C.E., James L. Hayes, Otto B. Shalk, W. T. Carpenter, Arthur R. Denman, William T. Hunt, William C. Smallwood.

New York City—George W. Fuller, C.E., F. C. Poucher, G. Everitt Hill, Bleecker Van Wagenen, H. D. Dickerson, C.E., Alexander Potter, C.E., George A. Johnson, C.E.

New Brunswick—David C. English, M.D., William S. Myers, Ph.D., H. Brewster Willis, John B. Smith, Sc.D.

Newton—Whitfield Gray, D.V.S.

Oceanic—John T. Nagle, M.D.

Old Bridge—Asbury Fountain.

Orange—Thomas W. Harvey, M.D.

Passaic—A. Ward Van Riper, M.D., Colin R. Wise, C.E., Robert M. Watson, C.E.

Paterson—John L. Leal, M.D., Wm. Herbert Lowe, D.V.S., Elias J. Marsh, M.D., Elias J. Marsh, Jr., M.D., John C. McCoy, M.D., William K. Newton, M.D., J. Waldo Smith, C.E., Franklin Van Winkle, C.E., James Fitzpatrick, William H. Macdonald, Henry Hewitt, M.E., Robert H. Curtis, M.D., B. C. Magennis, M.D., R. Godeffroy, C.E.

Philadelphia—Charles M. Auerbach, John C. S. Davis.

Point Pleasant—Warren Hardenberg.

Plainfield—Charles J. Fiske, Andrew J. Gavett, C.E., B. V. D. Hedges, M.D., J. B. Probasco, M.D., Norman H. Probasco, M.D., L. R. Thurlow, Arthur Hall Dundon, M.D., John O. Brien, Jr.

Princeton—V. W. Bayles, C. F. Brackett, M.D., Gen. A. A. Woodhull, M.D., E. H. Loomis, Ph.D.

Riverton—Alex Marcy, Jr., M.D.

Red Bank—Edwin Field, M.D.

Rahway—Fred. W. Sell, M.D.

Roosevelt—Edw. J. Heil.

Rutherford—S. E. Armstrong, M.D.

Salem—Henry Chavanne, M.D., William H. Chew.

Short Hills—Stewart Hartshorn.

South Orange—John B. Dunckle, C. E., Spencer Miller, Medford Runyon, M.D.

Spotswood—Bernard Macfadden.

Summit—B. S. H. Baker, C.E.,John E. Rowe, Jr. D. V.S.

Titusville—A. W. Hartwell.

Trenton—William Elmer, M.D., James M. Green, Ph.D., Geo. W. McGuire, R. B. FitzRandolph, A. C. F. R. M. S., Judge Wm. M. Lanning, John C. Smock, Ph.D., J. B. Betts, David S. South, H. B. Boice.

Verona—H. D. McCormick, M.D.

Westfield—J. B. Harrison, M.D., R. R. Sinclair, M.D.

Williamstown—Luther M. Halsey, M.D.

Woodside—Clyde Potts, C.E.

PROCEEDINGS

OF THE

Thirty-fourth Annual Meeting

OF THE

New Jersey Sanitary Association

HELD

Friday and Saturday, Dec. 4 and 5

1908

IN THE

Laurel-in-the Pines Hotel, Lakewood, N. J.

TRENTON, N. J.
MacCrellish & Quigley, State Printers.
1909.

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Second Vice-President,............EDWARD GUION, M.D., Atlantic City.
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Committee on Membership and Registration—Edward Guion, M.D., chairman, Atlantic City; G. E. McLaughlin, M.D., Jersey City; B. V. D. Hedges, M.D., Plainfield.

Committee on the Organization of Anti-Tuberculosis Societies of New Jersey—Thomas W. Harvey, M.D., chairman, Orange; Irwin H. Hance, M.D., Lakewood; David C. English, M.D., New Brunswick.

Committee on the Education and Training of Health Officers.—John L. Leal, M.D., chairman, Paterson; B. V. D. Hedges, M.D., Plainfield; G. K. Dickinson, M.D., Jersey City; H. C. H. Herold, MD., Newark; A. A. Woodhull, M.D., Princeton.

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Contents.

Membership and Objects of the Association.

The New Jersey Sanitary Association is composed of professors and teachers in our colleges and schools, municipal officers, health officers, lawyers, physicians, veterinarians, clergymen, civil engineers, sanitary engineers, architects, plumbers and other citizens of our State interested in sanitation as related to our homes, our schools and our municipalities.

Any citizen may become a member of the State Association on application to the Secretary or any member of the Executive Council on the day of meeting. The membership fee is TWO dollars per year, payable in advance.

The objects of the annual meeting are the presentation of facts, the comparison of views, and the discussion of methods relating to the prevention of sickness, and the promomtion of health. The Association also, through the annual meeting, seeks to impress upon the public the importance of securing wise, and preventing harmful sanitary legislation, and also to aid the State and local Boards of Health in their efforts to secure better administration of our health laws for the good of our citizens and the healthfulness and prosperity of our State.

By an arrangement between this Association and the State Board of Health a part of the annual meeting is devoted to such subjects as relate to the work of local Boards of Health. Every local Board should have present at the annual meeting its Health Officer, Inspector or some other active member. The information secured for the benefit of each locality far more than compensates for the slight expense.

MINUTES

OF THE

Thirty-fourth Annual Meeting of the New Jersey Sanitary Association,

December 4 and 5, 1908.

Officers, 1907-1908.

President,	JOHN B. DUNCKLEE, C.E., South Orange.
First Vice-President,	WILLIAM G. SCHAUFFLER, M.D., Lakewood.
Second Vice-President,	RUDOLPH HERING, C.E., Montclair.
Third Vice-President,	EDWARD GUION, M.D., Atlantic City.
Secretary,	JAMES A. EXTON, M.D., Arlington.
Treasurer,	GEORGE P. OLCOTT, C.E., East Orange.
Chairman Executive Council,	JOHN B. SMITH, Sc.D., New Brunswick.

The Thirty-fourth Annual Meeting of the New Jersey Sanitary Association was held in the assembly room of the Laurel-in-the-Pines, Lakewood, N. J., and it was called to order at 4:15 P. M., Friday, December 4, 1908, by the Chairman of the Executive Council, Prof. John B. Smith, Sc.D.

PROF. SMITH—It seems that it is the practice to have the Chairman of the Executive Council call the meeting to order. That is one of the duties he has to perform. He has also to state that there was a meeting of the Executive Council held during the month of June, and that at that time we agreed upon the program which is now in your hands, and which we trust will prove interesting and helpful. I want to report further that during the year we have added fifty members to our list, and have now a total membership of two hundred and twelve. There will be a meeting of the Executive Council this evening after the conclusion of the general session. I now have the honor to introduce to you Mr. John B. Duncklee, of South Orange, President of the Association.

THE PRESIDENT—The first paper on the program is entitled "Sanitary Inspection of Schools," and it will be presented by Dr. W. G. Schauffler, of Lakewood.

(For paper by Dr. Schauffler see subsequent pages.)

THE PRESIDENT—The general discussion on this paper was to have been opened by Mr. S. E. Shull, Superintendent of Public Schools, Perth Amboy, N. J., but we are advised that Mr. Shull is detained at a meeting of the teachers' institute of Middlesex county, and is therefore unable to be present. The paper will be thrown open to general discussion, and the time of speakers is limited to five minutes.

DR. SCHAUFFLER—Might I suggest that when the rest of the report is read to-morrow possibly the gentlemen will care to discuss it as a whole, and if there is no objection we might discuss it at that time.

THE PRESIDENT—If there is no objection the suggestion of Dr. Schauffler will be followed, and we will proceed to the next paper on the program, which is "The Necessity for Schools of Instruction for Health Officers," by Dr. John L. Leal, of Paterson.

(For paper by Dr. Leal see subsequent pages.)

THE PRESIDENT—This paper is now open for general discussion.

DR. RICHARD C. NEWTON, of Montclair—I would like to call attention to the fact that Cornell University has opened a school of sanitary science for the instruction of sanitary officers of health. Such a project is also under consideration in Yale, and the graduates of that school are intended to be on the same standing as the officers of public health in Great Britain. These officers are highly educated men and receive a salary of one thousand pounds a year. If we pay the right salary we will get good men, and it is hoped that in a few years such men will be educated.

DR. SCHAUFFLER—I would like to ask if any steps have been formulated by this committee for instruction in various places, somewhat on the line of the commission of New York State, where meetings are held in various districts and where health officers are brought in and given a couple of days of practical instruction?

DR. D. E. ENGLISH, of Millburn—I wish to say that I hope Dr. Leal's paper will be referred to the Legislative

Committee for consideration and action. Dr. English then made a motion to that effect, which was carried.

THE PRESIDENT—Any further discussion on this paper? If not we will proceed to the third number on the program, which is a symposium on tuberculosis. Sub-division A of this symposium, entitled "The Necessity of the Bovine Tuberculin Test," will be presented by Prof. E. B. Voorhees, Sc.D., Director of the New Jersey Agricultural Experiment Station, New Brunswick, N. J.

(For paper by Prof. Voorhees see subsequent pages.)

THE PRESIDENT—The discussion on this paper will be opened by Dr. D. H. McAlpin, of Morris Plains, New Jersey.

DOCTOR MCALPIN—After listening to Dr. Voorhees' admirable presentation of this much-discussed subject, it would seem unnecessary for me to take up more of your time, but I might take the time assigned to me to emphasize a few of the important facts brought out in this paper. When there is a great diversity of opinion concerning any subject, as there is with regard to tuberculosis, it seems to me the only way to accomplish any steady advancement is to definitely state the facts upon which we do all agree, and which have been demonstrated without a doubt.

For instance, we all agree that there is such a thing as tuberculosis, and that there are two types, one affecting human beings and one affecting animals. There is a question as to whether or not they are intercommunicable. There is ample evidence to show that the human being is subject to both kinds of the infection, human and bovine. The subject is of great importance to farmers, for anything that produces a deterioration in the value of his property means loss of capital to him. An animal infected with tuberculosis is generally conceded to be of less value than a well animal. In proportion as the disease advances the value diminishes. Therefore it is essential that the farmer, who desires to suffer the minimum amount of loss, should know at as early a stage of the disease as possible which of his cattle are affected. For in the incipient stages the animal can be used for beef; and milk that is treated by some of the scientific methods, such as pasteurization, can be used for human consumption, or for raising young stock. Dr. Voorhees has spoken most excellently of the use of the

tuberculin test. He has described the dangers and why some farmers are opposed to it. If you ask a farmer why he is opposed to the tuberculin test, he will reply that he does not believe in it. The reason for his unbelief is his fear that conditions may be found in his herd which will necessitate the loss of his animals without a sufficient return. This is really what prevents the majority of farmers from accepting these up-to-date methods of diagnosis. We all know that the disease is communicable and is spread from one animal to another, either by contact with a sick animal or through the building which has been infected by a sick animal. Frequently farmers who have animals which they know to be infected use those animals to raise calves. And it is almost certain the cow will infect the calf. It is dangerous to have such cows around on the farm. This is only another reason why they should be isolated and sent to a so-called Observation Farm. This takes us to the consideration of the Bang System, which is simply the removal of infected animals from the herd, placing them in separate barns where they can be treated and observed, for the purpose of allowing the farmer to get as much return as possible from them. The reason this method has not become more popular is because it incurs an increased expense to the small farmer. It is applicable to herds consisting of fifty or more cows, but the small farmer with but one to ten cows cannot without great expense use this method of isolation. I would therefore suggest that this Association use its efforts to promote the establishment of Observation Farms in the different counties, to which farmers may bring the animals which have reacted to a test in their own barns. These animals can be kept on the farm for the purpose of observation; the milk can be pasteurized and used; on certain days, selected for slaughtering, a government inspector could be present and such cattle as would pass his inspection could be disposed of for food. Without going into detail here, it seems to me that this would incur the minimum amount of loss to the farmer, and would largely overcome the prejudice which at present exists.

In regard to the growth of the tubercle bacilli in milk, it is a fortunate thing that the tubercle bacilli will not develop and grow in fresh milk between the time of its being milked from the cow and consumed, as raw milk, but that the tubercle bacillus will remain virulent for a long time in butter and cheese.

THE PRESIDENT—This discussion was to have been continued by Dr. J. W. Fink, of Newark, N. J., but as Dr. Fink is not present we will proceed with sub-division B, "Methods of Organization in the Tuberculosis Campaign," by William C. Smallwood, Executive Secretary of the New Jersey Society for the Prevention and Relief of Tuberculosis.

DR. ALBERT E. ROUSSEL, of Philadelphia—I wish to speak a moment if I may. At a recent meeting of the National Medical Congress, the Association passed a resolution that in the sense of the Association it was understood that the bovine type of tuberculosis is transmissible to man. For many years this has been thought probable, but on account of the fact that Dr. Koch has taken a stand against this theory there has been some doubt. The later method of testing for the presence of tuberculosis is by the use of vaccine. A certain percentage of tuberculin is vaccinated on the arm. I had a case at the Howard Hospital where the physical signs were clear and distinct, but the case would not respond to tests. In despair I gave the patient a lapse of time, and then vaccinated with bovine tuberculin and my response was perfect. Therefore I think bovine tuberculosis is probably more common than we imagine. Although I do not doubt I have drunk tubercular milk, I would hate to recommend milk for human subjects even where there were little physical signs of the disease in the cow.

DR. J. E. ROWE, of Summit—I thought possibly that Prof. Voorhees would bring out the percentage of cows throughout the United States which are affected with tuberculosis. It was brought out by the Bureau of Animal Industry to be ten per cent. throughout the United States, and that one per cent. of the cattle used for meat purposes were so affected. If that is the case it seems the test is an absolute necessity. It was also shown that the test has been found to be absolutely correct in ninety-eight and two-thirds per cent. of all tests made by the Bureau. I think that bears out what Prof. Voorhees says, that the test is authentic. In reference to the necessity for disinfecting a premises after a herd has been tested and the infected animals taken out, I would like to say that I tested three years ago a herd of six cattle and three of them showed tuberculosis. About six months later the three which did not react were tested, along with three others which had been recently purchased, and the entire six reacted. This shows the necessity for

thorough disinfection. They have now set fire to the barn and are building a new one. The absolute necessity of periodical inspection is also shown by the fact that in a herd which I examined every six months we will find two or three on reinspection which will show signs of tuberculosis.

THE PRESIDENT—If there is no further discussion we will listen to the paper by Mr. Smallwood.

(For remarks by Mr. Smallwood see subsequent pages.)

THE PRESIDENT—I regret very much that because our time of closing is drawing near we cannot take up the discussion of this paper, but will proceed to the next number on the program. Before doing so, however, I wish to call the members' attention to the fact that the registry book is near the door, and we hope that all members who have not registered will do so before they leave the room.

The next paper is sub-division C, "Home and Sanatoria Treatment," by Dr. Samuel B. English, Superintendent State Sanatorium, Glen Gardner, N. J.

(For paper by Dr. English see subsequent pages.)

THE PRESIDENT—The hour having arrived when it is customary to adjourn the afternoon session, it will be necessary for us to defer the reading of the next paper until some future session. We will now adjourn until eight-thirty o'clock this evening.

EVENING SESSION.

The evening session was called to order by the President at 8:45, and prayer was offered by Rev. C. P. Butler, of Lakewood. The address of the President, John B. Dunck-lee, C.E., of South Orange, N. J., on "The Reclamation of Lands Subject to Tidal Overflow," was then presented.

(For address of the President see subsequent pages.)

THE PRESIDENT—The next paper on the program is entitled "The Washington, D. C., Aqueduct and Filtration Plant," to be presented by E. D. Hardy, Member American Society of Civil Engineers, Superintendent.

(For paper of Mr. Hardy see subsequent pages.) The paper was illustrated with a large number of lantern slides.

THE PRESIDENT—We shall now have the fourth paper on the program, which is "The Progress of Mosquito Extermination Work in New Jersey," by Prof. John B. Smith, Sc.D., Entomologist.

(For paper by Prof. Smith see subsequent pages.) This paper was also illustrated with many slides.

THE PRESIDENT—At this time we will listen to the paper which was deferred from the afternoon session. This is paper D of the Symposium on Tuberculosis, and is entitled "After Care of the Discharged Patient." It will be presented by Dr. Theodore Senseman, of Atlantic City.

(For paper by Dr. Senseman see subsequent pages.)

THE PRESIDENT—This paper will be briefly discussed by Dr. Roussel, of Philadelphia.

DR. ROUSSEL—I want to express my pleasure in having been with you and having had the opportunity of hearing these papers, particularly the last one, for the reason that I read a paper on a closely allied subject recently. We have made the returned patient's lot a difficult one. Certain it is that the returned tubercular patient, whether from a sanatorium or from his home, finds his opportunities for resuming work which was more or less suitable previous to his present condition of health, have now been materially diminished. The result is he struggles along despairingly and, in many instances, ends his career in the almshouse. This is a subject of very important bearing, and the more one reflects upon it the more one thinks some decided step should be taken by the State in the endeavor to remove many of these obstacles. Such steps have been taken in Germany, and there in some communities the returning patient is taken in charge by special committees. The man is advised as to his manner of living and given occupation, and gradually the hours of work are increased until his resistance has been so benefited that he reaches the normal state. In the majority of these instances the work must necessarily be out of doors. Some statistics which have been collected go to show that in New York and Pennsylvania the chances for individual occupations are many times those of the Western States, which up to the present time have led largely in the care of tuberculous patients. It would seem, therefore, that the eastern patient has a better chance than in the less thickly populous communities. The Pingree Association,

started by the mayor of Detroit and afterward carried on in other parts of the country, takes steps toward securing employment in the husbandry industry. In Germany this has been taken up so that in many places special licenses are given to individuals. Much work needs to be done in this connection. I trust the attention of our medical bodies and sanitary associations will be called to the necessity of furnishing more individual work along these lines.

THE PRESIDENT—Before announcing the next paper, which will be the last of the evening, I would remind the members of the Executive Council that a meeting will be held after this session adjourns. I would also request any members who have not yet registered to do so before leaving the room. The next paper is entitled "The Sanitation of a Clean Mind and a Happy Disposition," by Rev. H. M. Gesner, of Atlantic City.

(For paper by Mr. Gesner see subsequent pages.)

On motion of Col. Olcott the session was then adjourned to be resumed at nine o'clock Saturday morning.

THIRD SESSION—SATURDAY, DEC. 5TH.

The third session was called to order by the President at 9:30 A. M., December 5th, 1908.

THE PRESIDENT—The first paper on the program this morning is on the subject of the "Pollution of the Delaware River; Its Cause and Remedy," and it will be presented by Harry M. Herbert, C.E., of Bound Brook, N. J.

(For paper by Mr. Herbert see subsequent pages.)

THE PRESIDENT—This paper was to have been discussed by F. Herbert Snow, C.E., but Mr. Snow wires us that he will be unable to be present, and I will ask Mr. Rudolph Hering to say a few words on this subject.

RUDOLPH HERING, C.E., of Montclair—This question of river pollution is one which has engaged the attention of the civilized world for some years, and it will be some time before we get all the questions pertaining to it solved. It started in England where the rivers are only

one-half the size of ours and consequently they are more easily polluted, and so that question was brought to the front first in England. They tried all sorts of means, and their rivers are not all purified yet. Germany started next and thought they had settled the matter by demanding sewage purification for their cities. That caused a great deal of opposition, and they found it an impracticable proposition. Boards of health had to take back a great deal of what they said. The whole matter practically rests on three foundations. One is the health question, the second the nuisance question, and the third the cost question, and they must all be considered. Regarding the health question we must see that our rivers are not furnished with pathogenic bacteria. We must see that these bacteria are kept out. In regard to the nuisance question, we must not put anything in the river which would make it look offensive and cause it to smell and be disagreeable. The engineer is brought perhaps more closely in connection with the third question, that of cost. The city will not do anything that will cost more than it can afford. Therefore the engineer must do things which can be afforded, and trust to the future to build up. So we must always consider those three questions. In the matter of keeping out disease germs, it does not seem as though there was any practical way of keeping those out, excepting to purify the sewage that goes in the stream, or do something which will at least kill the pathogenic bacteria. Take, for instance, a large city where it is very expensive to purify the sewage; it seems now as though we are getting to a point where we can destroy the pathogenic bacteria without going to the enormous expense of turning sewage into potable water, which we set out to do years ago. I believe we will succeed in that and still comply with all three conditions.

The question of nuisance came up first most strongly, perhaps, in Chicago. There the sewage of that large city went into the lake from which drinking water is obtained, and something had to be done, and it was finally decided to build a canal from Lake Michigan to the Mississippi river and take the sewage in a manner which would not create a nuisance. That was the chief thing. At that time it was supposed that the health question would be taken care of, as no water supply was to be taken between Chicago and St. Louis. The question of nuisance was a new one at that

time. The studies in Europe and America together show that it was a question of dilution. It is not necessary to go into that now. I merely want to say that it was found that a certain quantity of water had to pass in order to dilute the sewage. When we came to gauge the river and to see how much sewage was in the river, it practically came down to this. Let us take the case of a large river with a flow of about three cubic feet of water per second, which is enough to take care of the sewage of one thousand persons. On that basis fifty million dollars were spent in Chicago for building the canal. It is now there and working satisfactorily. You all heard of the remonstrance made by St. Louis that they did not want to drink all of Chicago's sewage, but the United States Supreme Court showed there was no evidence of pollution in the water when it got to St. Louis.

The large question is the cost question, and that is up to the engineer. He must figure it out and try to present a solution to the people which will be satisfactory at the least cost. We have a lot of methods, starting with the intermittent sand filtration, which we think is the best to-day. If the work is properly done all pathogenic disease germs must be removed. Berlin has thirty thousand acres of sand land upon which to purify her sewage. How could we get that area? We cannot do it; we have to get some other method. The other methods are not as good. We can purify the sewage in various ways. The best way we know now is by the so-called sprinkling filters in which the sewage is oxidized, and it is the oxidation of the sewage which purifies it. Now we have gotten down to a method which will do the work fairly good and to a practical degree, and, therefore, we are now able to say you must purify your sewage. Formerly the people said we will do it, tell us how; and we could not do it, but now we can. In the case of the larger cities, if situated on a large stream, in practice it will amount to this—that you will use the water of the stream as far as it is possible to purify the sewage of the city. They have not been able to change that in Europe, and we will not be able to change it here. Therefore every stream should have a certain designation. Sewage must be treated differently, according to whether the stream is to be used as a water supply or if it is not. If used as a water supply it must receive a certain amount of sewage which it can purify. We should remember that fact. If we succeed

in being able to do something with the sewage which will kill the pathogenic bacteria, we will have solved all the questions, and I hope we will be able to do that in the next generation, and then we will not be so afraid of putting sewage into the stream. The first thing to do is to screen the sewage so as not to have floating matter come down the stream, such as we see in New York, where everything goes in the sewer, and that the people object to. That is wrong; it should not be; it should be kept out by screens. That is the way the German Government has solved the problem; it demands that the sewage be screened, and after that there must be a certain dilution for the rest of the sewage. No longer is the entire purification of sewage insisted upon there.

THE PRESIDENT—Any further discussion on this subject? Has Mr. Phelps anything to say?

EARLE B. PHELPS, C.E.—There are certain features of this matter which appeal to me as sadly in need. In the first place I think States should get together and pool their interests, and agree among themselves and aim for higher things, rather than fight each other. In a great many instances fights between States have occurred. Mr. Hering has referred to the one between St. Louis and Chicago. That has been the general line of action always. My own State of Massachusetts has always been in advance on these lines, but we must admit that in the case of our largest rivers we are not now up to the New Jersey standard. Another thing is this fact, that the engineer of the State Board of Health appears before a body of health officers, explaining to them, and through them to the public which they represent, the reasons for these things, getting right down to the people and saying that it is for the people's interest. It is not an arbitrary thing. The State Board of Health is working for the interest of these communities, and trying to show them that it is for their interest to do these things. I was talking to a gentleman in Philadelphia who has been up against the State Board of Health. A month ago he was a little bit sore. Yesterday he started the interview in this way: he said, my boy has got the typhoid fever, and I am fully in agreement with Mr. Herbert; I think this river should be cleaned up. The man had a different point of view. I think we are particularly fortunate in hearing Mr. Hering's summary of conditions

There is no doubt in my own mind that this question must be solved on the lines laid down by Mr. Hering. We do not want to do more than is necessary. We want to accomplish the direct requirements in each case and no more. Mr. Hering said there are certain definite things required in each case, and it was useless to try to remove all sludge and organic matter if the river is ample to take care of such matter. We have for a good many years been able to purify sewage to certain stages, and we have recognized in a general way the different kinds of bacteria. Within the last two years we have been able to add a little more to the general type of sewage purification, and that is in the line of chemicals by which we can purify the sewage without going through the whole combination. That seems to me to be particularly applicable to large streams in the case of which there is no question of putrescibility and no question of sedimentation, or not generally so, in which the only question is that of possible contamination of shell fish or water supplies. So you see we have rounded out our types of purification in the experiments of the last few years, and we will be able to get satisfactory results.

DR. R. C. NEWTON—Unless we have a National Board of Health to stand at least in an advisory capacity, we are not going to succeed in purifying our streams. As Dr. Darlington said, it is impossible for the New York Board of Health to keep the Hudson river clean because Connecticut will defile it. And so with the Ohio river, unless the National Government shall supervise the movement we will not accomplish much. Therefore I should like to offer the following resolution:

"*Resolved*, That in view of the enormous advantage in the matter of purification of rivers and streams that should follow the establishment of a National Board of Health, that this body hereby heartily endorses the movement now on foot to secure the establishment in the immediate future of a National Board of Health." This resolution was adopted.

DR. SCHAUFFLER—I would suggest that the action of the Sanitary Association in this matter be communicated directly to those who can help most in this cause.

ALONZO BROWER—This Association, as I understand, stands for the betterment of the sanitary conditions of the

State of New Jersey. It seems to me there is more that can be said and more that can be done in relation to New York City sending out its sewage and garbage to the detriment of the Atlantic seacoast. It seems to me the Legislative Committee of this Association should take this up, and that something might be done to remedy the trouble. I have been down on Shark river, and have not only seen the garbage, but the sewage as well, coming in the inlet, and I could see the scum on top of the water. It seems to me this Association should take this up.

THE PRESIDENT—If there are no more remarks we will pass to the next paper, which is number two, "The Modern Treatment of Sewage," by Emil Kuitchling, C.E., of Brooklyn, N. Y.

(For paper of Mr. Kuitchling see subsequent pages.)

THE PRESIDENT—The discussion on this paper will be opened by Clyde Potts, C.E., Morristown, New Jersey.

(For remarks by Mr. Potts see subsequent pages.)

THE PRESIDENT—Any further discussion on this paper?

G. EVERITT HILL, C.E.—It seems to me very well to say a word or two concerning the discharge of sewage after partial filtration into a stream, and about the best method of doing it. Suppose you get out practically all of the suspended matter; we know if we put sewage into a body of water certain changes will take place. In other words, although the solids may be dissolved somewhat they are capable to a great extent of certain precipitation. It is perfectly possible, therefore, that if the effluent is discharged into a body of water that there may be produced at the particular point of discharge certain products which may prove offensive in character. I have seen cases where the deposits near the shore were very considerable and were exposed at low tide, and where they were covered with flies and the flies would carry the deposits to houses. I have seen cases where the water was so badly discolored that the offense to the eye was very perceptible, and property has depreciated therefrom. It seems to me the sewage should be distributed as much as possible. I think that is one point that ought to be remembered.

M. R. SHERRERD, C.E.—In hearing this excellent paper by Mr. Kuitchling, and knowing what care he has given in

estimating the proportion of solids taken out, it has occurred to me that it would be well for us to bear in mind that in the sewage of this country the proportion of solids is apt to be of much smaller weight per million gallons than is the sewage of German cities, where the amount of water used is so much less than in American cities and the sewage is much heavier in solids.

MR. HERING—I should like to say it is very gratifying to see how the United States is moving along in this matter of sewage purification, and I think we are getting over the whole field in a much more rapid way than they have been doing in Europe, where each country has tried to solve the question in relation to its own condition. I want to say that I was much pleased to hear the papers of Mr. Herbert and Mr. Kuitchling, because they show how much more advanced we are to-day than we were ten years ago. I think the State of New Jersey has taken an excellent step in seeing that all streams are kept in proper condition, and that there is no unfairness between municipalities as to what they shall do. I want to say in reference to Mr. Hill's remark, that the proposition of the distribution of the sewage of the Passaic valley is being carried on along just the lines on which he has been speaking. For instance the sewage is not discharged as in Boston, but the sewage is discharged into a large number of small places across the current so that it will be diluted by the mass of passing water, which according to my calculation is about as large as is necessary to properly dilute the sewage, so there is hardly any possibility of getting any offensive conditions there. The sewage is to be discharged at least forty feet below the surface of the water, and as it rises up and scatters it meets a body of water which will give it the Chicago dilution at the worst time of the tide. There is enough velocity of the water to dilute the sewage. A portion of the water is always moving, and I don't see how we are going to see much sewage in the bay from the sewage discharged from New Jersey. I don't think there is any comparison with the way in which New York discharges its sewage. I thought it might be well to say a word or two about these new sewage methods. We are not unanimous by any means as to how these methods should be worked and applied. I had the good fortune of inspecting a lot of this work in Europe this summer, and the opinions there do not agree with this country.

It seems the one great agreement, however, is that purification is accomplished through oxidation. The question seems to be to get the sewage in such condition that it can best be oxidized. It is much easier to oxidize the dissolved matter, so we have the sprinkling filters. There is a disagreement in Europe as to the size of stones and as to the depth of beds. Of course it is all a question of money, and that is a very important question. We find some of these sprinkling filters stopped up, and that means a big expense. They are trying to get to the point where they do not need these at all, so there will be no accumulation. It seems, the way things are moving in Europe now, that it is a question of surface of stone. That is where the bacteria are, and where they do their work. The bigger surface you give, the more bacteria will be there to do the work and will do better work. That seems to me the explanation why sand filters have done the best work. Stones of one-half the diameter will give the greater surface. In sand you have a larger surface than if you have broken stone. In Germany and England it is a question of what size and of small size stones. If you have large sized stones there is the advantage that you get more air there. There is less friction and the oxidation is therefore greater. Another thing, when you get too small stones then you get a filling up; that is, little shreds in the sewage if not filtered out will come along and fill up the bed and clog it up. In Madison, Wisconsin, this thing occurred. It seems to me the practical solution is going to be a compromise, and nothing but experiments will give us the best thing. In Baltimore they decided on a bed of eight feet in depth, while in Columbus it is only six feet. I do not want to make any prognostication as to what is going to happen, but I think we want to move along conservatively, and in a very few years we will know more than we do to-day. It requires more study. They are going on rapidly now in Europe, and we are also progressing. I don't think it will be very long before we will get satisfactory results. There is one point that I would like to mention; that is, the matter that comes out of these filters is a blackish, non-putrescible substance which they call "humus" in England. The water when it comes out of sprinkling filters is by no means clear, it is turbid, and they want to run that water into a settling basin so the sediment will settle out and the clear water then runs off, and that is quite satisfactory. These settling basins have also been

proposed here in a number of places. If that river in which you are going to discharge your effluent runs with the usual amount of turbidity which is caused by ordinary rainstorms, what is the use of investing money in settling basins to take out something that is no worse than that stuff which nature carries down these rivers, and for that reason sometimes settling basins may not be necessary. That is all right in Europe where the streams are clear, and not dirty like some of ours. We must discriminate and not copy blindly from Europe.

THE PRESIDENT—The third paper on the program is entitled "The Prevention of Dust on Highways," and it will be presented by James Owen, C.E., of Montclair.

(For paper by Mr. Owen see subsequent pages.)

THE PRESIDENT—This paper is now open for discussion.

DR. N. L. WILSON, of Elizabeth—This certainly is a timely and practical paper, and from the standpoint of the rhinologist I want to say there is no doubt in my mind of the deleterious effect of dust on the mucous membranes. Certainly my business has been increased since the advent of automobiles. I sincerely hope our engineers will take this subject up and carry it through successfully, so that we may have this disagreeable feature of the effects of automobiles eliminated.

DR. D. C. ENGLISH, of New Brunswick—I have not given this question sufficient thought to intelligently discuss it, but I want to express the great pleasure I have had in listening to this able paper, and I want to second the remarks of Dr. Wilson. I think the specialists in his department of the practice of medicine are not the only ones interested in this subject, but the members of the medical profession, generally, who believe in preventive medicine, and it interests also sanitarians generally. We should remember that the character of the dust is not that of the old time roads—an impalpable powder largely, but of gritty mineral particles largely from the material now used in road building. Not only is the nasal mucous membrane affected by the dust raised since automobiles have come into use, but the respiratory organs generally are affected. The irritative effect on the respiratory organs I think is appreciated by the practitioner and the sanitarian, and it seems to me that this subject is very timely and one which properly

comes before us as a sanitary association. It is worthy our careful thought, and not only our careful thought but the adoption of some measures by which this nuisance and detriment to health shall be prevented, or to the greatest extent possible minimized.

Mr. Hering—There has recently been a meeting of an International Congress to consider this very subject. It met in Paris in the month of October last, and I would like to ask Mr. Owen if he knows of the conclusions of this Congress. I have failed to post myself on the results, but I think it interesting to know what they concluded was the proper thing to do.

Mr. Owen—The final result was very unsatisfactory. In the first place they did not agree. The American engineers separated themselves and came together afterward. The final result was that they were unable to bring in any official declaration. The fact has arisen in France that they claim that the tar dust from the roads lying on the grapes absolutely spoils the flavor of the wine, and therefore there is a strong protest to the French Government against the use of tar. As far as this country is concerned I don't know of any such criticisms. There is objection to the killing of trees by this tar coating. In England there have been one or two reports of injuries caused by tar. So this same protest coming from France and from this country has had a deterring effect, but the practice is so universal there and in England that until we get some other preparation, I have no doubt the tar process and the mixture of tar and asphalt will be continued. I think very highly of this idea of using some artificial binding. It depends on the character of the soil what we shall do. In Philadelphia they have a hard asphalt pavement, three inches in depth, which seems to carry all the travel. We must appreciate the conditions of the locality. The pavement in East Newark is rutted from the travel. The difficulty is that when ruts occur you cannot eliminate them. In Kansas City it was claimed that it was soft and not the thing.

Mr. Hering—I remember a few years ago when I happened to be in California near San Francisco. So far as the grapes were concerned, in some of the vineyards it was found that the wine was objectionable on account of the long dry season, and the grapes were covered with dust,

and naturally that did not improve the flavor of the wine. When they asphalted the roads I happened to be there, and shortly after that where they manufactured a popular wine the improvement was certainly enormous in the wine, and they tell me it was as a result of asphalting the roads around the vineyards. I don't know if they are having the same experience as that in France.

DR. ENGLISH—There is only one other thing I want to say. The author of the paper referred to Kansas City. In a brief sojourn there, a short time ago, I was stopping at a residence on one of the boulevards, and it seemed that the oiling of the extensive boulevards in that city was a perfect success.

MR. S. M. GUNN—One thing I think interesting, and that is in reference to the use of chain tires on heavy cars. It seems to me that chains on heavy cars can cut through the surface and overcome the resiliency of the road. I understand that in Massachusetts there is talk of getting legislation to prevent the use of chains on heavy cars. I would like to ask Mr. Owen if he thinks the chain would cut through.

MR. OWEN—A few years ago it was decided that chains should be prohibited entirely, excepting during periods of snow and ice.

DR. JAMES A. EXTON—In my experience through life I have found that boards of aldermen are about the hardest kind of men to handle on earth. For some time I have tried to get a shade tree commission established in our town without success. I sent to East Orange, Newark, Plainfield and different places where shade tree commissions are in operation, and I got numbers of copies of pamphlets of different ways, and I made up my mind it was not worth while to send them to the men, but the only way was to go and read them to them. When a man is appointed an alderman he is just as good as any sanitarian and he knows it all. Then I started out on this good roads improvement, and tried to put oil on the roads. I tried to get the men to go and look at the roads. For a long time they would not go, but at last I succeeded in getting them to acknowledge it was a fine thing, but then they said the ladies say it tracks in the house and spoils the carpets. I said, why don't the people stop using it then. The only

way to get on the right side of the alderman is to put the information in his possession, and the only way I know is to get this information printed and send it to all aldermen, and then we may get some improvement. They quarrel about the expense of water, and it is gone in a short time. I move, therefore, that the Committee on Printing be authorized to have extra copies of this paper printed and circulated in a proper manner through the different ladies' societies and civic societies, and to the aldermen in person throughout the State. An amendment was offered that township committees be added. A further amendment was also offered that the distributing of the paper be done through the Secretary. The motion as amended was carried.

The President—We will proceed to the fourth item on the program, which is the reports of the chairmen of the standing committees. The first committee is that on Publication, and the report will be given by the Chairman, Dr. D. C. English.

(For report by Dr. English see subsequent pages.)

Dr. English—In presenting the report I want to make one remark in reference to the papers this year. I am very happy to say that the papers presented are in unusually good form—most of them typewritten—and need very little correction.

Motion was made and carried that the report be received and the recommendations contained therein be adopted.

The President—The next will be the report of the Committee on Membership and Registration, by Dr. Edward Guion, the Chairman.

Dr. Guion—The Committee reports that the usual lines of work have been carried out, and up to the present time the Secretary has received the applications of sixty-one persons, all of whom have been recommended for election.

The President—I would again remind members of the importance of registering their names before they leave. It is suggested that it may make a difference in hotel bills. The next is the report of the Committee on the Organization of Tuberculosis Societies.

In the absence of Dr. Thomas W. Harvey, of Orange, the Chairman, this report was presented by Dr. D. C. English.

(For report as read by Dr. English see subsequent pages.)

THE PRESIDENT—The question is what action will you take on the report of this committee.

MR. OWEN—I move that the report be accepted and that the committee be continued. This motion was carried.

THE PRESIDENT—The next is the report of the Committee on the Education and Training of Health Officers. Dr. John L. Leal is Chairman of this committee.

DR. LEAL—The committee will report progress, and expresses the hope that during the coming year something tangible may be done.

THE PRESIDENT—The report of the Committee on Medical and Sanitary Inspection of Schools will be given by the Chairman, Dr. Schauffler.

DR. SCHAUFFLER—As I reported yesterday when reading my paper, the committee found so much to do in this line that they divided the work up in three parts. The first I presented yesterday, the second will be presented by Mr. J. B. Betts, Assistant State Superintendent of Public Instruction, and the third by Dr. Richard C. Newton, of Montclair.

(For papers read by Mr. Betts and Dr. Newton see subsequent pages.)

DR. SCHAUFFLER—The committee presents these reports and I move that the committee be discharged.

DR. E. J. MARSH—I second this motion that the committee be discharged, and would like to say just a word. A considerable proportion of our child population is found in our cities in our private and parochial schools, and they should be remembered in medical inspection. Another thing is that children who are found suffering from minor contagious diseases are sent home, and the parents often will pay no attention to the matter; they think it a good way to keep the child out of school. Another point is when minor surgical defects are found, the child is sent home and the parent often takes no action. At the same time the State law requires compulsory education, and parents should be required to take steps for the correction of these troubles. I would offer an amendment to the

original motion to the effect that the report of the committee be referred to the Legislative Committee for action, and that the attention of the committee be called to the necessity of obtaining thorough medical inspection of public schools and of private and parochial schools as well, and of calling the attention of parents to the necessity of correcting the defects in school children.

This motion, with the amendment, was carried.

THE PRESIDENT—The report of the Committee on Legislation will be presented by the Chairman, Col. George P. Olcott.

COL. OLCOTT—The committee has nothing to report as nothing has been brought to their attention.

MR. SHERRERD—May I bring up a subject for the consideration of the Legislative Committee? This Association of course stands for the prevention of disease rather than its cure. I am satisfied, and I know quite a number join with me, that one of the large contributory causes of the infection of surface water supplies by typhoid bacilli is from the discharges from railroad trains traveling over the water sheds, and in order to reach this very dangerous cause of infection I tried to get a bill passed through the New Jersey Legislature last winter that would place the control and regulation of the use of closets in railroad trains traveling over watersheds supplying municipalities with water in the hands of the State Board of Health. I succeeded in getting the bill through the House, but it was held up in the Senate. It would have passed the Senate, I think, if the Senator from Essex had not forgotten to call it up. I would like to ask this Association to recommend to the Legislative Committee that some measure of this kind be urged upon the New Jersey Legislature. The whole control of the subject was to be placed in the hands of the State Board of Health; they were to create districts, and the regulation of the matter was to be in their hands. I am quite sure the epidemic in Scranton last year was caused by this infection, and the New York Health Commissioner has reported that an epidemic in New York State was caused by this infection. The danger of infection of this kind is so apparent that some recognition of this matter must be brought to the attention of the railroads, and certainly even in our large terminals there ought to be some sanitary form of closet adopted. Adequate legislation is

likely to be opposed by the railroads, but I think if this Association took it up it would help to secure it.

DR. NEWTON—We find that typhoid fever has been spread to passengers by drinking water in railroad trains which is taken from towns where typhoid fever is prevalent and put in these cars, and I would like to suggest that this matter also be taken into consideration.

The motion as amended was carried.

Mr. Owen offered the following resolution, which was adopted:

"*Resolved,* That the mosquito control and extermination work as now carried on in this State is of the highest possible sanitary and economic importance, and that it should be prosecuted and completed as rapidly as possible."

Mr. George S. Drew, Jr. offered the following resolution:

"*Resolved,* That inasmuch as it has been found that in some of the smaller sanitary districts great laxity and inefficiency in the administration of the business of local health boards prevails, while the work of educational boards in the same district is fairly effective, it is the sense of this Association that steps should be taken by its Legislative Committee looking toward the placing of local health boards in a similar attitude toward the State and State support as that now occupied by local boards of education."

This resolution was adopted.

THE PRESIDENT—The next will be the report of the Treasurer.

COL. OLCOTT—Before making this report I would like to state for the information of the members that a death has occurred among our number since the last meeting of the Association. The fact has apparently been overlooked by the officers, and no committee was appointed as usual. I have taken the liberty of preparing the following resolution, which I now offer:

WHEREAS, Since our last annual meeting death has removed from our membership Elias J. Marsh, M.D., of Paterson; therefore,

Resolved, That in his departure we, the members of this Association, have lost not only a good friend, but also one

of our most able and earnest workers, and we enter on our records an expression of our deep sense of loss and of our sympathy with his bereaved family.

This resolution was adopted.

COL. OLCOTT—I would also like to report that we have lost by death one whom I do not remember seeing often at our meetings, but he always took an interest in our work, and that is William Elmer, M.D., formerly of Trenton.

THE PRESIDENT—We will now have the report of the Treasurer.

(For Treasurer's report see subsequent pages.)

THE PRESIDENT—The next will be the report of the Auditing Committee.

DR. GUION—The Auditing Committee examined the report of the Treasurer and found it correct.

Motion was made and carried that the reports of the Treasurer and of the Auditing Committee be accepted.

The report of the meeting of the Executive Council was then read by the Secretary, together with a list of names of proposed members.

(For list of members see subsequent pages.)

Motion was made and carried that the Secretary cast the ballot electing to membership persons whose names had just been read.

THE PRESIDENT—We will now have the report of the Nominating Committee.

MR. HERING—The committee is somewhat in doubt as to whether it is instructed to nominate members of committees, and therefore would like the opinion of the Chair.

THE PRESIDENT—It seems to have been the custom in recent years for the committee to nominate members of committees, and the Chair will rule that this be in order.

(For list of officers and members of committees, which were then read by Mr. Hering, see subsequent pages.)

DR. D. C. ENGLISH—In order that there may be no misunderstanding, the Chairman of the Nominating Committee reporting that the committees will be made up as heretofore, I would like to call attention to the fact that one or

two committees have been discharged and therefore they are not reappointed.

THE PRESIDENT—We have discharged the Committee on Medical and Sanitary Inspection of Schools, and therefore that committee is not included in the list.

No other nominations having been made, a motion was made and carried that the Secretary cast the ballot electing the gentlemen as named by the Nominating Committee. This was done, and they were declared to be elected.

COL. OLCOTT—Perhaps the members will be glad to know that we now have a membership of two hundred and forty-six.

MR. HERBERT—I move that a vote of thanks be extended to the managers of the Laurel-in-the-Pines for the hospitality and courtesy extended to the members of the Association. This motion was carried.

DR. F. W. SELL—I move that the Legislative Committee be asked to recommend some method by which the control of the spread of rabies may be made more effective. I have had an experience with rabies this year that I do not want to have again. This motion was carried.

DR. SCHAUFFLER—In this house this afternoon the State Committee of the New Jersey Society for the Prevention and Relief of Tuberculosis meets. You are all invited to be present. Those staying over Sunday I would invite to attend a local meeting on tuberculosis this evening in the Young Men's Christian Association building in this town.

Motion for final adjournment was then made and carried.

PRESIDENT'S ADDRESS.

The Reclamation of Lands Subject to Tidal Overflow.

JOHN B. DUNCKLEE, C.E., SOUTH ORANGE, N. J., MEMBER AMERICAN SOCIETY OF CIVIL ENGINEERS.

The Atlantic coastal plain, extending from the eastern slopes and foothills of the Appalachians to the Atlantic Ocean, has for the most part a gradual slope which, as it approaches the ocean, becomes quite flat, with surface elevations but slightly above the level of mean tide. At the mouths of many of the rivers which rise in the mountains and flow down through the sloping plain, finding outlet in the Atlantic or in its more important estuaries, these conditions are more marked. In many instances these river outlets were once wide and comparatively shallow bays in which the detritus, brought down by the fluvial current in times of freshet, has gradually been deposited, by reason of the diminished velocity of the stream, due in part to the widening banks and in part to the counter action of the flood tide. It has thus resulted that wide flats and shoals have gradually been formed, composed, for the most part, of alluvial deposits of mud, with occasional layers of sand or other sedimentary material. These flats and shoals are gradually built up each year by deposits of sediment, brought down by the annual freshets, until they reach the level of low tide. Vegetation then begins to appear, first in the form of coarse sedges and aquatic plants and, later, various marsh grasses appear. This growth greatly facilitates the deposit of sediment, whenever it is carried in suspension by the fluvial or tidal waters which flow over the marshes, until, in the course of years, the area is gradually raised to approximately the level of high tide, and here the building work of nature necessarily ceases, except during freshets or unusually high tides. As a natural result of this process, the deposits along the water-front of the marsh are

oftentimes more frequent or greater in amount than toward the rear, so that the exterior border of the marsh is generally higher in elevation than the interior—a condition which prevents free natural drainage and results in the formation of stagnant pools at the rear. Along the ocean and as far inland as the inflow of salt water extends, these marshes are "salt-marshes," and have, therefore, no value for agricultural purposes beyond their yield of salt hay. When, however, they are situated in the proximity of large cities or important towns, they often come to have a definite value by reason of the need of additional area for the expansion of manufacturing industries, for wharf frontage, railroad yards and like purposes. It is at this point and under these conditions that the sanitary aspect of these extended marsh and half-tidal areas demands our attention, and measures for relief become often most urgent. The sewage discharged into the river by cities on its border and carried down by its current is, at high tide, often deposited on the flats and spread over the marshes and gives rise to noxious and unsanitary conditions, while the pools of stagnant water, left by unusually high tides, become breeding places for the mosquito.

It, therefore, fortunately comes about that the existence of lands subject to tidal overflow in the vicinity of large cities causes an urgent public demand for the reclamation of these lands both for commercial purposes and for sanitary improvement, and it often thus becomes practicable to obtain funds for the work on commercial considerations where, for sanitary purposes alone, they could not be obtained in sufficient amount to permit efficient work. The State of New Jersey lies, for the most part, within the Atlantic coastal plain, which has been described and comprises within its area nearly 300,000 acres of salt marsh, while in the northern part of the State large areas of these marshes are in the vicinity of important centres of population.

In its broadest sense, the term "Reclamation," as applied to engineering operations for the improvement of lands, now includes not only the supply of water to arid lands by methods of irrigation, but the removal of surplus water where is is in excess, as well as protection against river or ocean overflow. The general methods adopted for the reclamation of lands subject to tidal overflow (or salt marshes) may be classified under three heads, viz.:

1st. Reclamation by drainage; 2d, reclamation by embankment; 3d, reclamation by elevation.

I. RECLAMATION BY DRAINAGE.

The improvement of salt marshes by drainage alone is the simplest and most economical method of rendering these areas available for the use of mankind, and, therefore, increasing their value, and for removing unsanitary conditions. It consists in excavating drainage ditches of such width and depth as the varying conditions may require, the main lines extending from the water frontage of the marsh to the upland at its rear. From the main lines, extending into the marsh on either side, lateral ditches are then cut. The width of the ditch should be sufficient to prevent its being closed by vegetation, while in depth it should extend down through the marsh sod and well into the mud below. In a general way it may be said that good results may be had with a lateral ditch 10 or 12 inches wide and 2½ feet deep. The main lines should be of sufficient width and depth to accommodate the combined tidal flow of the laterals. They are often made from 6 to 10 feet wide and used for boat navigation, being crossed where needful by light plank bridges. These open ditches effect only a "tidal drainage;" that is to say, on the ebb tide the water, with which the marsh is saturated, gradually seeps out into the laterals, while on the return of the flood this is only partially re-absorbed. There thus results, in the course of time, a gradual improvement in the physical condition of the marsh; the sod becomes firmer, the sedges and coarse grasses disappear and are replaced by the distinctive marsh grasses, which are cut and made into hay for bedding stock or for packing.

It should be said that this method of marsh drainage is not, strictly speaking, a true reclamation, inasmuch as the tide still flows and ebbs freely; it is, however, a distinct improvement, and so might be called a partial reclamation. It is by no means a new method, for it has been practiced on the eastern coast of Massachusetts for more than half a century. On the salt marshes bordering the Charles river near Boston, for instance, the writer has often observed this system of marsh improvement, and it here has long enabled the farmers of this region to harvest an excellent quality of salt hay.

In the State of New Jersey we have a recent example of the drainage of salt marshes in the work of abolishing mosquito-breeding marsh areas, which has been inaugurated within a few years and which constitutes a forward step in sanitation.

2. RECLAMATION BY EMBANKMENT.

In the reclamation of marshes by embankment the lands subject to overflow are enclosed by an embankment or dike and the area to be reclaimed drained either by a system of open ditches or by covered tile drains. Where creeks cross the marsh dikes will also need to be built along their banks.

The embankment or dike should be designed so as to have ample stability to resist the greatest water pressure which can be brought against it and also so as to resist the erosive action of the waves during high tides and storms. The dike is usually located at a moderate distance back from the immediate margin of the tidal marsh, leaving a space in front termed the "fore-shore," which will be overflowed by high tides. The depth of water over the fore-shore during high tides is slight, and wave action correspondingly diminished, so that this expedient affords protection to the exterior face of the dike. Embankments or dikes are usually constructed of the material of which the marsh or shoal is composed. The ordinary salt marsh, with a dense growth of marsh grass and an alluvial soil thickly interlaced with fibrous roots, affords an excellent material for building embankments, the sod being placed on the slopes. Where wave action or freshet currents are liable to erode the exterior slopes they should be protected by rip-rap, or rough paving.

Dikes along tidal and other marshes are apt to be invaded by muskrats, who industriously dig holes through the bank, causing many leaks and often endangering the security of the dike during high tides. In order to minimize the danger from these animals it is usual to build the dike or embankment with a core or center of sheet piling or rough boards. Rough hemlock boards are reported to have proved quite effectual for this purpose. A better plan would probably be to build the embankment with a core of bank gravel, for while the holes of the rodents would hold their form in the firm or fibrous mud, in the core the fine gravel would fall down and fill the hole, and so puddle the embankment and

prevent the passage of anything more than a slight infiltration of water. A thin wall of reinforced concrete, with a heavy wire mesh, would make an excellent core, and would serve the double purpose of preventing penetration by rodents and securing a fairly water-tight embankment

It is evident, as has been stated, that a large marsh area thus surrounded by an embankment will need some means of drainage to remove the rainfall and the water with which the soil is saturated at the outset. This result is usually effected by a system of open ditches such as has been described or by covered tile drains leading at suitable intervals to the rear face of the dike, where tidal sluices or self-closing tide gates are placed at about the level of low tide. These gates are constructed so as to open and permit the outflow of the impounded water during the last of the ebb tide, but on the first turn of the flood tide they at once close and prevent the flooding of the enclosure by the tidal water.

Sluice gates built with two leaves working on vertical axes have been found quite efficient for this purpose. From the very nature of the case this method of drainage can be only partially successful, for under the head of the rising tide there is a constant although perhaps a small infiltration of water under the embankments through the porous subsoil. Still the sluice gates accomplish useful results in gradually draining the marsh, removing the water of saturation down to a level approximating that of low tide, and thus effecting a decided improvement in the texture and condition of the soil. The rain water falling on the marsh gradually leaches out the salt, and the marsh in time becomes fresh and may be fitted for the cultivation of many crops.

On important and extensive works, tide sluice gates may need to be supplemented by a system of pumps and constant pumping, to keep the reclaimed area free from rain and tidal water. Such pumping systems present no unusual engineering difficulties, the ordinary centrifugal pump or some form of low pressure pump serving the purpose. A pumping system involves a constant outlay, and there needs to be exercised also a constant supervision over the dikes and sluice gates especially during high storm tides. For these reasons it is generally impracticable for small individual owners of marsh lands to carry out and maintain successfully extensive systems of reclamation by embankment. In order to ensure the best results a work of this character needs to be carried out by an organization of

such owners in some corporate capacity, or by the municipality or State through some constituted authority.

A notable example of reclamation by embankment is the well known and extensive work in Holland, where large areas of land have been reclaimed, most of which are below the level of the sea. The Harlem Lake, for instance, was covered by a body of water 13 feet in average depth. On this work some 42,000 acres of land were reclaimed, some of it being 20 feet below sea level. It required four years of continuous pumping to remove the water, and the pumping is constantly continued to remove the surplus rainfall.

In the United States we have an extensive application of the general principle of embankment protection in the well known system of levees in the lower valley of the Mississippi river, which, however, is a fluvial or non-tidal stream. Here the object sought, and successfully accomplished, is the protection of vast areas of agricultural lands against overflow by freshets by means of a system of levees.

3. RECLAMATION BY ELEVATION.

The reclamation of lands subject to tidal overflow by elevation consists in filling the entire area with suitable material, and gradually raising the grade of the area to a height of at least three feet above the highest tides. In order to provide efficient surface drainage for the reclaimed area, the grade of some portions will, of course, need to be fixed at a higher elevation. The filling should be so carried on as to exclude and not impound the tide waters. and in some cases temporary ditches may be needed to effect this result. The material for filling is either obtained (1) from adjacent or even distant uplands or hills, or (2) by dredging the bed of the river or harbor on which the lands to be reclaimed have their frontage. In the first case the filling should begin at the edge of the upland and be carried out over the marsh toward the river. In the second case an embankment will be needed along the water front to confine the soft dredged material and protect it from erosion.

The most recent extended work of reclamation by elevation in this country is that of the Potomac River Improvement at Washington, D. C., which was carried out under plans approved by Congress, by the United States Engineer Department, and of which work the writer was resident engineer. On this work there were developed new

and economical methods of dredging and depositing material, and as an illustration of the most recent practice in this line of engineering the work accomplished will be briefly described.

Washington is situated at the head of tidal navigation on the Potomac river, and when the city was first laid out, about the year 1800, the river had no less than three navigable channels, each with a sufficient depth of water for the vessels of that day. But as the lands bordering the Upper Potomac and the Shenandoah rivers were cleared and put under cultivation, the rains of each successive season washed the light alluvial soil into the river so that it gradually became a sediment bearing stream. Directly in front of Washington the Potomac changes from a fluvial to a tidal stream, and at the same time its width suddenly expands from 1,000 to 6,000 feet, with the result that the sediment brought down by the river was being rapidly deposited, causing the formation of bars in the channel and of wide flats along the entire water front of the city. This deterioration of the river channels went on until about 1875, when the merchants of Washington and Georgetown found that their river trade was suffering in consequence, and the question of improvement was agitated and widely discussed.

Meanwhile the wide flats which had formed in front of the city had become shallower than ever, and in some places had been raised by accretions to a height of a foot above low tide, while in others the depth of water was from one to four feet at low tide. One of the largest trunk sewers of Washington discharged near the shoalest part of the Potomac Flats, and the sewage was carried over them at high tide and distributed among the rank growth of sedges and aquatic grasses, thus creating unsanitary and malarial conditions which rendered the adjacent portion of the city uninhabitable and greatly endangered the health of the community at large. As may naturally be supposed, the river became very unsightly, and as a large area of the flats was situated at the western extremity of the Mall and directly in front of the Washington Monument, the landscape features, which are justly the pride of the National capital, were thus greatly marred. To devise a plan of improvement which should correct these undesirable conditions, and at the same time meet the many engineering difficulties involved, was a task of no small magnitude. But after a careful study of the question in all its bearings, plans were sub-

mitted to Congress, and adopted by that body in 1882, which have successfully accomplished the three-fold result of at once improving the navigation of the Potomac, bettering the sanitary condition of Washington, and at the same time reclaiming a magnificent park area along the river front of the city.

The principal features of the project, which is known as the Potomac River Improvement, were the improvement of the navigable channels, the reclamation of the flats, the construction of a sea wall around the reclaimed area, and the construction of a large tidal reservoir. From an engineering point of view the work was unique and in some features practically without precedent, so that in the execution of the improvement new processes, methods of work and plant were necessarily devised or adapted to the existing conditions in order to secure the most economical and efficient results. The channels were to be widened and deepened by dredging, and the dredged material was to be deposited on the flats so as to raise them above tidal and freshet overflow. The dredging could readily be done by the "clam-shell" and "dipper" dredges then in use, but to spread the material over flats three miles long and half a mile wide was quite another problem. On the first contract the material was dredged by large "clam-shell" dredges and placed in scows, which were then towed to the shore and dumped in basins which had been previously dredged at the outer ends of tramways built of pile trestle work and extending across the soft mud flats. Other dredges stationed at the dumping basins redredged the material and loaded it into small cars, which were then drawn out on the tramways by locomotives and dumped on the flats. By reason of the redredging the material had become somewhat viscid, and it was found that it would flow slowly for a distance of nearly two hundred feet from the tramway. About 1,500,000 cubic yards of material were deposited in this manner. It was entirely successful, but owing to the double handling of the material and the expensive pile trestle work, the cost, about 22 cents per cubic yard, was in excess of the unit price of the original estimate.

Fortunately at this juncture the then recently invented hydraulic dredge had demonstrated its practicability on the Pacific Coast, and on the second contract for channel work hydraulic dredges were employed. With the hydraulic dredge, the material after being loosened by suitable cutters

is pumped (with a large admixture of water) from the bed of the river by means of large rotary or centrifugal pumps fitted with a suction pipe, and then discharged on the shore through a long discharge pipe. Between the dredge and the shore the discharge pipes are supported on small floats or pontoons, while on the shore they rest on the newly filled ground. As there were then no dredges of this class on the Atlantic Coast, it was necessary to build dredges expressly for this work. While the dredges were being built, the basins needed to hold the mixed water and mud until sedimentation had taken place were formed. The entire exterior margin of the flats to be reclaimed was surrouned by an embankment gradually built up of material dredged from the adjacent river bed, and placed in position by "clamshell" dredges fitted with long booms. Interior embankments were built from the material already deposited on the flats, and the basins thus formed were provided with waste wiers for the overflow of the surplus water. The hydraulic dredges proved to be satisfactory and accomplished the work rapidly, and as the dredging and deposit were completed in one operation there was a material reduction in the cost, so much so that the combined dredging and deposit of material which had formerly cost 22 cents per cubic yard was now done for 12⅓ cents per yard, and in some cases for 9 cents per cubic yard.

In carrying out this improvement over 11,000,000 cubic yards of material were deposited on the flats, chiefly by hydraulic dredges, raising the flats to heights of from 6 to 12 feet above mean low tide. The greater part of the material was dredged from the main or Virginia channel of the river, which leads to Georgetown, and from the Washington channel, which is an inner channel giving access to the city wharves for steamboat and general freight traffic.

In order to renew the water in the Washington or inner channel and keep it in good sanitary condition, a large tidal reservoir was constructed, covering 110 acres. It is 8 feet in depth and is surrounded by a masonry wall 6 feet in height, and has at its outlet a granite masonry gate structure provided with automatic tide gates, which discharge about 15,000,000 cubic feet of fresh water into the Washington channel at every ebb tide, thus ensuring perfect circulation and entire freedom from stagnant water. The sea wall surrounding the reclaimed area is a notable feature of the improvement, being five miles in length. It is built of stone

masonry resting on a rip-rap foundation, and is 6 feet in height.

The total area of land reclaimed from tidal overflow by this improvement is 621 acres. It is the property of the United States, and has now been set aside by special act of Congress as a public park for the use and benefit of the people, to be known as Potomac Park. The work has proved a most profitable investment for the Government, for by the expenditure of about $2,300,000 it has acquired a property which at a very conservative valuation is worth $6,750,000.

Comparing the last two methods of reclamation, it may be stated that the method by embankment results in a surface elevation of the reclaimed area below the level of the highest tides and in some cases below the level of low tide. The reclaimed area is, therefore, constantly menaced by the danger of inundation, which is greatly increased during the high storm tides to which the Atlantic coast is subject. Where the land is adapted to and is used for agricultural purposes an inundation would be serious, and be attended with a loss dependent upon crop conditions, but where the land is used for commercial and manufacturing purposes an inundation would be disastrous and the loss would be very great.

Moreover, as has been stated, reclamation by embankment or diking may involve a constant outlay for pumping as well as for maintenance of the dikes and drainage system, conditions which can, as has been stated, as a rule only be satisfactorily fulfilled by an organized corporate body representing the land owners or the community. It will be found, therefore, that lands so reclaimed will not readily sell for manufacturing or commercial purposes, for those who have capital to invest in manufactories or other industrial plants, or in the construction of warehouses, will not invest it where serious loss is liable to occur from storms or tides or from any lack of proper maintenance of protecting works. Reclamation by elevation, on the other hand, brings the grade of the improved area well above the level of the maximum tides, and provides in a large degree for a natural surface drainage, and provides land which is at once safe from inundation and available for industrial uses. This method will be found, therefore, the best for reclamation in the vicinity of large cities. The cost of reclamation by elevation is greater than that by embankment, but the land reclaimed by elevation is far more valuable.

SANITARY AND MEDICAL INSPECTION OF SCHOOLS IN NEW JERSEY.

WILLIAM GRAY SCHAUFFLER, M.D., LAKEWOOD.

I have taken the liberty of changing, somewhat, the title of my paper, and trust that the Association will pardon me for so doing. Later in this session I shall have the honor of bringing before you the report of a committee appointed last year on "Medical and Sanitary Inspection of Schools." We found the subject so large and of such vital importance that we have divided it up, and shall present it to you from three standpoints:

1. The practical working of medical inspection of schools; 2. Results so far obtained here and elsewhere, based on reports and special data obtained; 3. Historical resumé of sanitary conditions; their needs and remedies.

In order that we may get before you, for your instruction and future guidance in framing possible legislation, as much material as possible, I am offering you the first part of this report as my paper at this time, trusting that you will give the report, as a whole, your renewed careful consideration when it shall reach you later in print.

The care of the health of teachers and children pre-supposes proper sanitary conditions for them to work in, and thus the sanitary inspection of school buildings and premises must necessarily come first. Such inspection, to be beyond reproach, should be twofold: 1st. It is the duty of all boards of health to keep close watch over the water-supply and drainage system of all school buildings, and rigid inspection and enforcement of all proper precautions must be insisted upon. 2. Taking this for granted, the board of education owes the community a further duty by supplementing the work of the health board in a more constant and minute inspection of buildings and premises. This inspection must include, not only the usually understood sanitary arrangements, but must take in proper accommodation for varying ages as regards seats and desks, lighting, heating, ventilation, lunch-rooms and playgrounds.

The disputed question as to what duties belong to the board of health and what to the board of education is gradually being worked out, and the concensus of opinion seems to be that the medical inspector shall be responsible to the school board, and work under the direction of the supervising principal, instead of taking his orders from the board of health. In this way friction is avoided, and the health board stands ready to assist without seeming to clash in any way with the school board.

The first law passed providing for medical inspection of schools was that of New Jersey in 1903, and it reads as follows:

Article 27, section 229:

"Every board of education may employ a competent physician, to be known as the medical inspector, fix his salary and define his duties. Said medical inspector shall visit the schools in the district in which he shall be employed at stated times to be determined by the board of education, and during said visits shall examine every pupil referred to him by the teacher. He shall, at least once during each school year, examine every pupil to learn whether any physical defect exists, and keep a record from year to year of the growth and development of such pupil, which record shall be the property of the board of education, and shall be delivered by said medical inspector to his successor in office. Said inspector shall lecture before the teachers at such times as may be designated by the board of education, instruct them concerning the methods employed to detect the first signs of communicable disease and the recognized measures for promotion of health and prevention of diseases. The board of education may appoint more than one medical inspector."

This law is not mandatory, and carries no penalty for enforcing care of sick or defective children by their parents, but it has been a step in the right direction, and has resulted in much good to our State. Its provisions are being carried out most successfully in Atlantic City, Asbury Park, Englewood, Camden, Long Branch, Plainfield, Newark, Orange, Passaic, Paterson and Union Hill, and we feel that the time has come when the law should be made mandatory. This was done in Massachusetts in 1906 and in England on January 1st, 1908.

In the best and most recent work written on this subject by Gulick & Ayres, from which I shall frequently quote in this paper, I find the following remark:

"The weak point in the New Jersey law consists in lack of authority vested in the board of health, or in the board of education to compel parents to give suitable treatment to those children excluded from school because of physical defects needing surgical treatment." Granted the need of medical inspection in our schools, which has been amply proved and the practicability of some simple system applicable to city and rural districts alike, which I hope to set before you, your committee feels that this association can set itself no better task than procuring for New Jersey a mandatory law for the medical inspection of schools.

To quote again: "The State provides for the education of all citizens as a measure of self-protection. The facts show that the State must also take cognizance of their physical welfare for the same reason. Health and education belong hand-in-hand. This means that the existing educational agencies must have associated with them expert medical officers, who shall see that the health of children is conserved through the schools. This cannot be the incidental activity of some department, but must outrank all others in power as it does in importance."

Again: "Medical inspection aims at both the protection of the community and furnishing the physical conditions under which wholesome life can develop. It involves in this comprehensive aim the functions of both the departments of health and education." That this inspection must be done by proper persons is self-evident. Volunteer or poorly-paid work is not long successful. Osler says: "If we are to have school inspection let us have good men to do the work, and let us pay them well. The work will demand a special training and a careful technique." The various methods of carrying out this work are summed up under four heads:

1. Examination by teachers for physical defects, such as faulty sight and hearing.

2. Examinations by physicians called in to diagnose contagious diseases.

3. Examination by physicians to determine both physical defects and contagious diseases.

4. Examination by teachers for physical defects and by physicians for all other conditions.

To this may be added the work of school nurses, who assist in preparing cases for the inspector's examinations, carry out routine treatment in the class of communicable diseases which need not keep the child out of school, and follow up the children in their homes and report as to whether proper treatment is given them. Experience has shown that the best success is obtained by giving the medical inspector full authority, and allowing him to use teachers and nurses as his assistants. This method insures individual responsibility, and yet saves the inspector's valuable time by delegating the routine clerical work to teachers and others, who are perfectly well fitted to do it.

It would seem wise to recommend for passage a law making medical inspection compulsory in all schools of the State, and fixing a minimum amount of work required of all inspectors. This should be so arranged that it will be feasible for the lowest grade country schools. With this as a basis, higher grade schools should be given permission to amplify, so that those having greater facilities may accomplish better results. An arrangement similar to that existing under the board of health could be introduced, allowing several adjacent school districts to employ a medical inspector in common, thus cutting down the cost of the individual district; and finally it could be made a part of the duty of the State Board of Education, through a standing committee, to indicate to each school in the State what grade of medical inspection shall be employed therein.

In conclusion, let me briefly outline the daily routine of the medical inspector in an average school. At a regular time each day, preferably during the morning session, he shall visit the school under his charge. He may either go from room to room, seeing such children as the teachers have set apart as suspicious, or these children are sent to the principal's room and are there examined. The inspector then decides whether cases suspected of commencing contagious diseases shall be

sent home with a card stating the nature of their trouble. If sent home the child may not return to school without a certificate from his family physician. Cases of lice and itch and ringworm are diagnosed and the parents' attention is called to simple means of treatment on suitable cards given to the child. Where school nurses are employed, they will follow up these cases, reporting to the inspector progress made, or failure to secure treatment at home.

Commencing with the opening of the school year, the inspector shall examine, as soon as possible, each child in the school under his care for possible physical defects interfering with healthy growth, either physical or mental. Such an examination includes search for defects of vision and hearing, and ascertains the condition of the child's throat, nose and teeth. If adenoids, enlarged tonsils or carious teeth are found, treatment is insisted on. Careful records are kept on cards especially prepared for this purpose. These records are the property of the school, and should be carefully preserved for reference from year to year. Under no circumstances may the medical inspector suggest or carry out treatment. This duty belongs to the parents and family physician.

Such a daily routine, as is outlined above, is simple and need not occupy undue time, either of teachers or scholars. The results, in preventing the spread of contagious diseases and in recognizing and correcting physical defects, which have unfitted the children for properly carrying on their school work, cannot be overestimated.

The cost to the community of employing good men capable of doing good work will be made up many times over by the increased freedom from epidemics, and more especially by the increasingly great proportion of scholars physically and mentally able to do the work of their grades.

TO WHAT EXTENT HAS MEDICAL INSPECTION BEEN INTRODUCED IN NEW JERSEY.

BY J. BROGNARD BETTS, ASSISTANT SUPERINTENDENT STATE DEPARTMENT OF PUBLIC INSTRUCTION, TRENTON, N. J.

The part of the report assigned to me is "To what extent has medical inspection been introduced in New Jersey." I regret to say that while a number of districts have appointed medical inspectors, in most cases the inspection is not as thorough as it should be, and in very few districts have adequate rules for the government of the inspector been adopted by the Board of Education.

The necessity for medical inspection of pupils was recognized in Europe as early as 1833, but no positive action was taken until 1874, when Brussels established a system of inspection of all pupils.

The United States was slow in following this good example, for it was not until 1892 that any action on this important subject was taken. In that year New York City, through its Board of Health, began the work. The good effect of the work was so manifest that other cities very soon established inspection that is more or less efficient. Generally this action was taken without express sanction of law.

New Jersey was the first State to prepare and distribute among the schools cards giving simple rules for the preservation of health, and it also has the honor of being the first State to enact a general law authorizing all districts to appoint medical inspectors. This act was passed in 1903.

The following year Vermont passed an act providing for an annual examination of the eyes, ears and throats of all pupils. In 1906 Massachusetts made medical inspection compulsory in all schools. These are the only States which have passed general laws relating to medical inspection in the schools.

The weakness in the New Jersey law is that the appointment of medical inspectors is permissive and not mandatory. It is doubtful if public opinion in 1903 would have warranted the enacting of a compulsory law. The time has now come, in the opinion of your committee, when the "may" should be stricken from the law and "shall" substituted. The law should also be amended so as to permit two or more small districts to unite in employing a medical inspector.

Superintendent Shull, of Perth Amboy, in a very able and interesting paper on medical inspection read before the Middlesex County School Board Association about a year ago, conclusively showed its value, not only in the improvement in the health of the pupils, but also in the increased effectiveness of the school work, and in the financial gain to the district through greater regularity in attendance. The ap-

portionment of our State School moneys is based on the number of teachers employed and the total days' attendance of pupils in each district. Superintendent Shull shows that the increased apportionment due to increased attendance about equals the cost of medical inspection. The gain from careful inspection and supervision not only in attendance, but also in the progress and deportment of the pupils, would more than compensate for the small expenses incurred.

The evidence that the schools are too often the means of spreading contagious diseases in a community is too strong to be successfully contradicted and statistics show that the loss of time on account of illness by pupils in our schools is so great that proper medical inspection is imperative. Dr. William H. Allen stated the case very concisely when he said, "When the State for its own protection compels a child to go to school it pledges itself not to injure itself by injuring the child," and there might well be added, and the community through the child.

In the rural districts it may not be necessary to have frequent visits by a physician, but annual inspections should be made, and the teachers should be taught how to detect the first signs of communicable disease and how to test the sight and hearing of their pupils. Short courses in the Normal Schools on these subjects would be of incalculable value.

Statistics show that in our cities about ten per cent. of the pupils in schools are suffering from diseases of such a nature as to warrant their exclusion from school. In a large majority of these cases if prompt attention were given the children would soon be able to return, and if school nurses were employed many of the pupils would not be compelled to lose a day.

It is a well settled fact that many pupils are condemned as dull or disorderly, when it is not their fault, but because of some physical defect. Numerous instances could be cited to prove the truth of this statement. Children who have been inattentive or restless, or who are unable to keep up with their classes, have frequently, after an inspection by a physician, had some slight defect remedied and become, instead of a cause of worry and discouragement to their teachers, the brightest and best behaved pupils in their classes. Careful medical inspection in various schools disclosed the fact that there were many cases of disease or physical defects which were totally unsuspected, and which seriously interfered with the progress of the pupils affected or with the well-being of the school. It is not my purpose to weary you with a mass of statistics, but one case in our own State may be interesting. In one school in Middlesex county an examination of 288 pupils resulted as follows: 136 had catarrhal trouble; 98 contagious disease; 33 had ear trouble severe enough to interfere with their work; 38 had eye trouble; 22 had pediculosis.

In order to ascertain to what extent medical inspection had been adopted in New Jersey, a circular was prepared and sent to all the boards of education with a request that answers be returned to the following questions:

Does the district employ a medical inspector? What salary does he receive? How often are inspections of pupils made? What is the nature and extent of such inspection? Does the district employ a school nurse? How often is the school house inspected? What is the nature of the inspection and by whom made? What assistance is rendered by the local board of health? What is the decrease in loss of attendance due to illness since medical inspection was established? What rules has the board adopted governing medical inspection?

Replies were received from a large number of districts, those not reporting being generally the small, strictly rural districts.

About 50 of the 456 districts in the State have some form of medical inspection. In the majority of these the inspection is only in cases where contagious disease is suspected. Very few keep satisfactory records. Asbury Park employs two physicians, who make a thorough examination of all pupils each year and examine special cases as occasion may require. Complete records are kept. Atlantic City employs two physicians and has annual inspection of pupils. The inspectors visit each school daily. Complete records are kept. The inspector examines each school building weekly. Cliffside Park.—Annual inspection of all pupils, and semi-monthly visits and oftener if called. Camden employs a medical inspector who devotes his entire time to the work. The school houses are inspected monthly and the pupils as occasion demands. There does not appear to be any record kept of an annual inspection.

Elizabeth employs three inspectors, two medical and one dental. The pupils and buildings are inspected monthly and oftener if necessary. Accurate records are kept. Englewood.—Annual inspection of all pupils and weekly in special cases. Jersey City has no medical inspector, but two nurses are detailed by the Board of Health. Montclair.—The inspector is employed by the Board of Health. There is an annual inspection of all pupils, and visits twice each week to examine suspicious cases. Newark employs sixteen inspectors who visit schools daily. Weekly reports are rendered.

Neptune township, including Ocean Grove, has an annual inspection of all pupils, with daily visits to the schools to inspect suspicious cases. New Brunswick.—Annual inspection and when called. North Plainfield.—Annual inspection of eyes, ears and throats. Visits to each classroom twice a week. Lectures to teachers twice each year.

Orange.-Has not appointed a medical inspector but employs a school nurse. She visits each school at least once a week and oftener if necessary. She renders daily reports. Passaic City.—Has two inspectors who visit the schools daily. Paterson has six inspectors. Every pupil is examined once each term, and daily visits are made to each schoolroom. The inspectors lecture before the teachers at stated intervals.

Perth Amboy has annual inspection of all pupils and visits to each class at least twice each month. Plainfield employs two inspectors. All new pupils are examined upon entering the school, others biennially. The schools are visited as occasion demands. Roselle.—Employs an in-

spector who visits the schools twice each month. South Orange has an inspector and daily inspection.

In the other districts employing inspectors it does not appear that records are kept or that any inspection is made except when contagious disease is suspected.

The salaries of the inspectors range from $50 to $2,400 per year. In nearly all cases the inspectors are employed by the board of education.

Perth Amboy is the only district which reports having kept any record of the effect of medical inspection on the attendance of pupils. Superintendent Shull reports that the actual gain is over three per cent. Two per cent. he attributes to the decrease in illness among the pupils and one per cent. to the increased confidence of parents that their children are as safe from contagion while in school as they are when at home.

Since the questions quoted above were sent out, a number of districts have appointed medical inspectors, and it is safe to say that before the close of the present school year the number of districts having a system of inspection, more or less efficient, will be double that of a year ago.

Middlesex county has twenty-two school districts. In fifteen of these schools physicians have been appointed. Superintendent H. Brewster Willis, of that county, a former president of this Association, recently organized a County Association of School Physicians. This is believed to be the first organization of the kind in the United States. The good effect of such an organization cannot be overestimated.

The importance of the proper heating, lighting and ventilation of our school houses was recognized by the Legislature in 1898, when an amendment to the school law was passed providing that all plans for school houses should be submitted to the State Board of Education for suggestion and criticism. In 1900 another amendment was made which provides that every class-room in a school house thereafter erected should provide 18 square feet of floor space and 200 cubic feet of air space per pupil, and that an approved system of ventilation should be provided which would give 30 cubic feet of fresh warmed air per minute for each pupil. Also that light should be admitted to the class-room only from the left and rear, and that the lighting surface should be equal to 20 per cent. of the floor space. The defect in the law is that there is no adequate inspection of school houses after they are erected; consequently ventilating systems are often rendered useless, either through the carelessness or ignorance of teachers and janitors. In addition to this many buildings are not properly cleaned and fumigated.

A thorough inspection of every school house should be made at least once each year and at such other times as may be necessary. The State Board of Health and the State Superintendent now have under consideration a plan for a thorough annual inspection of every school house. Your Committee recommends that if legislation be needed, a law be passed providing for an annual inspection under the direction of the State Board of Health, and that the inspector of every local

board of health inspect the schools in his municipality at such other times as may be necessary. A report of each inspection should be made and a copy filed in the State Department of Public Instruction, with the County Superintendent of Schools, and with the local board of education. Blanks for reporting inspections should be furnished by the State Superintendent.

MEDICAL AND SANITARY INSPECTION OF SCHOOLS.

BY RICHARD COLE NEWTON, M.D., MONTCLAIR.

In France certain steps toward establishing medical inspection of schools were taken as long ago as 1833, when the school committees of cities and towns were charged by law with the duty of keeping the school houses clean. Four years later a royal ordinance especially enjoined the female supervisors of national schools (kindergartens) to watch over the health of the little children. In 1842 and '43 decrees were issued directing that every public school for boys and girls should be visited by a physician, whose duty it should be to inspect the school buildings and the general health of the school children.

It seems that these laudable ordinances were not effective, from failure to appropriate the necessary funds. Hence, the medical profession—then as now ready and anxious to help along every great philanthropic movement—was appealed to do the necessary work for nothing, which they generously did, carrying on these inspections gratuitously for years. In 1879 the General Council of the Department of Seine voted to reorganize the medical service in the schools, and passed an appropriation to pay salaries to the physicians. In January, 1884, the service was again reorganized. Needed regulations were drawn up and the districts were changed so each inspector had charge of fifteen to twenty school-rooms. It is from the year 1884 that the present system of medical supervision of schools in Paris dates. The organization has served as a model for similar arrangements in other French cities. Through the school law of 1886, as well as by ministerial decrees and orders issued in 1887, medical and sanitary inspection has been made obligatory in all French schools, public and private. In the city of Havre, in 1875, the first public dispensary for children was founded.

In Germany medical inspection of schools was begun in Dresden in 1867, when three physicians, formerly teachers of physical training, were appointed to examine children suffering from a contagious disease of the eyes. Not until twenty-two years later, however, was a real system of medical inspection of schools adopted in that country. The movement spread so rapidly that in a short time it had been taken up by city

after city. In Wiesbaden a careful and thorough physical examination was made of each scholar on entering the school, and a re-examination was provided for in the third, fifth and eighth years of the public school course. The Wiesbaden system of school inspection also includes a careful examination for contagious diseases and a sanitary inspection of all school buildings and their surroundings. In 1898 this system of school inspection was adopted generally throughout Germany, and after its introduction an entirely new phase of the school inspection systems of Germany was inaugurated.

The chief characteristic of this method is the great importance which it attaches to the hygiene of the scholar, without in any way disregarding the hygiene of the school building. The medical inspection of the schools, which had begun to relax, has since the introduction of the new plan gained rapidly. Wiesbaden was the first German city to make a test examination of all pupils, whereby an unusually high percentage of defects was revealed, of which the pupil, the teacher and the parents were wholly ignorant. The Wiesbaden school authorities saw at once that a medical examination of all the children entering the schools was of the utmost importance, and accordingly adopted the following plan:

They provided for the systematic examination of the heart, lungs, throat, spine, skin and the higher sense organs (and in the case of boys examination is made for hernia also). The findings are entered on a report blank, which accompanies the child from grade to grade in his school life. Twice a year the teacher records the weight and height of individual pupils, and whenever it is deemed necessary the school physician takes chest measurements. The records of children who seem to require the care of a physician are marked accordingly, and such children show themselves at stated intervals to the school physician. As just pointed out, a careful re-examination of all pupils must be made in their third, fifth and eighth school years. In this system it is the duty of the school physician to give advice to the teachers in regard to the children, and where defects, requiring medical attention, are discovered the parents are notified. It is not expected that the school physicians will give medical treatment to the scholars.

In Hungary the law of 1887 provides that school physicians shall regularly visit the various institutions of learning. They have the hygienic supervision of school rooms, and must make detailed examinations of all children entering school. They must also give lectures on hygiene in the schools. In Austria medical inspection of the schools is provided for, as follows: In the different crown lands it is under the Provincial Councilor of Education; in the school districts it is under the district school boards, and in the different communities under the local school boards.

In Norway, the health of pupils must be examined three times a year—in May, August and December—and a report must be drawn up in a prescribed form by the board of teachers and physicians, who are to give special attention to the causes of absences from school and to headache and fatigue in the scholars. In Sweden, in 1863, the school

physicians only examined the pupils with reference to excuses from gymnastic exercises. In 1874 committees on health were given charge of the schools, especially with reference to ventilation, and since 1878 the school physicians have been required to examine into the health of children at the beginning of the school year and to report the results.

In Roumania, since 1899, physicians are required to examine all school children at least once a year, to inspect buildings in reference to construction and equipment (heating, light, cleanliness, drinking water, privies, etc.) and to report upon all matters affecting the health of the pupils. Moscow has had school physicians since 1888. They must examine all the scholars at least yearly, and make reports on the "sanitary lists" of the children. They vaccinate and re-vaccinate the pupils and treat the indigent ones free of charge. In Switzerland medical inspection has become a national movement, although governed by different regulations in the different cantons.

In England the medical inspection act, which went into effect January 1st, 1908, is national in its scope, and applies to all the public elementary schools. It is thorough in providing for a complete system of medical supervision. For the purpose of making this act effective the county educational committees throughout England have taken active steps toward creating the necessary machinery and perfecting the existing organizations of medical officers. Already there is a national society of medical officers for schools. In France such a society has long existed, and has now begun the publication of a monthly journal. Since 1882 Cairo, Egypt, has employed a school physician at an annual salary of 12,000 francs, having two assistants with salaries of 3,600 francs. They have supervision of 5,000 pupils. School physicians in Chile must visit and inspect each school at least once a month, and hand in a report upon all the sanitary conditions of the buildings and the health of the scholars.

In the Argentine Republic the system of medical inspection of schools is claimed to be one of the best and most efficient in existence. It provides for vaccination of the pupils, the careful inspection of the buildings and their surroundings, the visiting of sick children in their homes, the prevention of contagious diseases, the delivery of regular scientific lectures and the giving free medical advice to both teachers and scholars.

In Japan in 1898, salaried school physicians were nominated in all the public schools. Their system extends all over the Empire, and reaches the most remote rural community. Hence the Department of Education is able to tell how many children there are attending school in the Empire, how many are robust, how many are of medium vigor and how many are weak or sickly; how many have defective eyesight, and what diseases are most prevalent at different stages of school life. The department also knows the average height, weight and chest measurement of all the pupils at their different ages.

In the United States, Boston seems to be entitled to the credit of establishing the first regular system of medical inspection of schools; which was done in 1894. Although two years before this the sanitary inspector of New York City had appointed a medical inspector of schools, who was probably the first medical officer of the public schools appointed in this country. In 1894 fifty physicians were selected by the Board of Health to inspect the public schools of Boston. In 1895 nine such inspectors were appointed in Chicago. In 1897 the Board of Health of New York City appointed one hundred and thirty-four medical inspectors for the public schools, with a chief inspector at a salary of $2,500 per annum. In 1898 the Bureau of Health of Philadelphia passed a resolution directing that each one of the fifteen assistant medical inspectors shall visit one public school in his district each day, inspecting it according to the methods employed in Boston, New York and Chicago. Since 1894 medical inspection of schools has been largely adopted throughout the United States, and in some States has developed from mere inspection for detecting contagious diseases into systems calling for the most thorough physical examinations. Only four general State laws, providing for or allowing medical inspection of schools, have been passed. They are as follows: In Connecticut in 1899, the Legislature passed a law providing for the testing of eyesight in all the public schools of the State. New Jersey has a law, which went into effect in 1903, authorizing boards of education to employ physicians as medical inspectors of schools and defining their duties. Vermont followed in 1904 with a law requiring an annual examination of the eyes, ears and throats of school children.

In 1906 Massachusetts passed a law which is comprehensive in its provisions, and mandatory throughout the State. It requires every town and city to establish and maintain a system of medical inspection by competent physicians for the detection of contagious diseases in the schools. Examinations must also be made annually by the inspectors of all the scholars for non-contagious physical defects, and their eyesight and hearing must be tested every year by the teachers. Without authoritative and specific enactment the State Boards of Health of New York, Utah and California have caused examinations of the eyesight and hearing of school children to be made.

There is, so far as can be ascertained, some form of medical inspection of schools in vogue at present in seventy cities in the United States, outside of Massachusetts.

I am indebted for these statistics to the work of Drs. Gulick and Ayres recently published.

From the data given we can see that the United States are behind a number of other countries in this important movement, but we also see from the rapidity with which the movement has spread in this country, and the great and increasing interest which it has excited, that its benefits have been widely recognized, and that with intelligent supervision and careful study a complete and efficient system, not only of medical and sanitary inspection of schools but of physical education for

all school children both in public and private schools, will in a few more years be inaugurated in America. A number of questions must be settled before this great advance can become general. And it is in the hope of casting some light upon these problems that your Committee has expended a great deal of time and thought upon their report. Space will not permit much further discussion nor the citation of many statistics when such are available, but it is hoped that the conclusions appended to this part of the report may at least receive a certain consideration, since they have been reached after much study and consultation with various authorities.

Medical inspection of schools is as yet in its infancy in the United States. I am only aware of one town where this inspection is carried out with considerable thoroughness, and that is Brookline, Mass. The visit of a physician to a school twice a week, or when summoned, to examine certain scholars already selected for inspection by a teacher, to ascertain whether they may have a contagious disease which makes them dangerous to their fellows, is a most excellent manœuvre so far as the prevention of epidemics is concerned, yet of itself it can have little influence on the physical education of the child or the sanitation of the school buildings. The examinations for physical defects of one sort or another, which are carried out annually as a rule in New York and other cities, reveal an astonishingly large percentage of such defects, and these results are in accord with the reports of similar examinations which have been made abroad. Without stopping to quote figures it would seem that fully two-thirds of all children in the primary grades of the public schools are suffering from physical defects more or less pronounced.

It is a comfort, however, to read in Gulick and Ayres' volume that these physical defects tend to diminish as children reach the higher grades in school, and their diminution is not by any means principally nor even largely due to the fact that the defective children tend to drop out of school, while those without defects remain and pass upward through the various grades towards graduation. The single exception to the foregoing statement seems to be the increase of defects in the eyes as children grow older in the schools. This also is especially true of students in the German schools and universities, where Cohn found that the myopia increased from 1.4 per cent. in the free village schools to 19.7 per cent in two realschulen and 26.2 per cent. in two gymnasia, reaching the astonishing figure of 59.5 per cent. in the university. As Risley points out, this increase in myopia has gone steadily on in Germany in spite of the improved hygienic surroundings in the schools. Whether it has done so in this country does not yet seem to have been determined. This question, as well as many others, requires careful study and will no doubt be vigorously pursued by the school inspectors of the future.

The teeth of school children would seem also to have received far more careful attention in Germany than in this country. A dental clinic has been established in Strasburg, where the cost of taking care of

the teeth of the public school children has been found to be twenty-five cents a year for each child, with a resulting great diminution in school absences, not only from toothache but from other diseases including infections. In Chicopee, Mass., out of five hundred children who were tested as to their physical condition 499 had defective teeth, and the five hundredth child, whose teeth were perfect, had spinal trouble, giving a hundred percentum of defectives. A series of elaborate examinations of the eyes, ears, teeth, weight, height, heart and lungs, and in fact the entire physique of the children in the public schools of Brookline, Mass. were made last year, and the interesting results were published and gave us food for serious thought.

The question is constantly staring us in the face, whether great and permanent injury to our children's health is not being done in the public schools. Certainly all the experimental work that has so far been done, goes to prove that our schools are needlessly expensive, and in many cases do irreparable damage to the health of our children. Scholars, who have attended school for half time, or who have not begun school life until eight or nine years of age, have so frequently surpassed those beginning much earlier and spending more hours in the school room, that we may well pause and inquire whether the seeds of most of the nervous breakdowns in our feeble young Americans are not sown in the early years of school life; and whether our methods of public instruction for the young are not unduly extravagant and wasteful, not alone because we try to teach them the "forty frills," as well as the "three R's," but because we insist on their beginning school at least two years too early, when they should be playing in the fields—and by our tedious school hours, ill-ventilated rooms, super-heated and steam dried air, we cause much of the bronchitis and pneumonia, not to mention the contagious diseases which we pay the medical inspectors to detect.*

Some better system of heating school-rooms must replace the steam-dried air we now use, which is the chief cause of bronchial sickness and colds, not to mention the lassitude, headaches and lack of the power of concentration which characterizes our school children through so much of the cold weather. Naturally in connection with heating we must consider also ventilation, which is, generally speaking, the *bete noir* of all public buildings. At the last meeting of the American School Hygiene Association, the experts present declared that no really satisfactory system of ventilation has yet been devised for public schools, and that no matter how elaborate or expensive a ventilating plant may have been installed in a school building, pure, fresh air for all the scholars in all the rooms, is only obtainable in many instances

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*A so-called "hospital system" of heating has been introduced in some buildings, by which a large quantity of fresh air is sucked into an air chamber by a large fan, through muslin screens, passing over a large steam coil, which heats it, and then over a tank in which free steam is generated from boiling water, which introduces the necessary moisture, which has been dried out by the steam of the air by passing it over the steam coil.

by opening the window, which as you are aware is generally forbidden by those installing the ventilating system.

There is no question of the advantage which has invariably followed the appointment of the school nurse. There should be one of these important functionaries, if possible, in every school building. At the least there should be, as Dr. Cronin, of the New York Board of Health, recommends, one nurse and one medical inspector for each 2,000 school children. We have no space to enlarge upon the value of the school nurse. There is, however, absolutely no difference of opinion as to her usefulness in every place where she has been installed. In New York City she receives $75 per month during the school year, and is said to much more than save the city the cost of her salary every year by the prevention of the spread of contagion. She visits and instructs the families of pupils who are sent home from school because of sickness. She ascertains whether the pupil's disability arises from anything in his home, and whether he may get such care at home as to render him fit to again attend school. He, indeed, may be suffering from trachoma, or some other contagion, which he has contracted from the members of his own family. She also prevents an almost incalculable loss of school time by cleaning the pediculous heads, administering the necessary baths, etc., to the pupils without sending them home, where very likely these useful functions will not be performed, from want of facility, knowledge, or disposition to do the proper thing. The school nurse also soon becomes quite an expert in the detection of infectious disease, as well as malingering amongst the scholars, and she should be a most efficient aid to the sanitary officer in regulating the heating, ventilation, etc., of the buildings.

A most important question has arisen in various localities in regard to the control of the medical inspection. In some places, this is vested in the board of health, and in others in the board of education, consequently, some friction has arisen and more or less misunderstanding in regard to the duties and obligations of the inspectors. The matter can be easily arranged, if it is clearly understood that the inspection for the detection of contagious diseases is a part of the duty of the health board. Whereas the detection and correction of non-contagious diseases and defects is, strictly speaking, a function of the physical education of children, and, as such, should come under the supervision of the board of education. Of course the two boards should work in harmony; in my opinion, they will be eventually consolidated. The day of the elective school board is fortunately passing away. Prosperous merchants and aspiring politicians have got themselves elected to school boards by unsuspecting citizens for many years. They have rivaled each other in their complacency and in the supine manner in which they have allowed the faddists and doctrinaires to encroach upon and modify the school curicula, until in some cities, the real intent of the school authorities semes to be not so much to advance the cause of sound learning, as to get the credit for being leaders of fashion by the introduction of variegated and dazzling innovations,

the utility of which is often more than doubtful. If there is one sign of the times more pronounced than another, it is that the public school, if it is to survive, must prove to the people that the education it provides is efficient and solid, and that the health of the scholars shall be in every conceivable way protected and enhanced during their school days. These are the days of efficiency and of simple and direct methods of activity. Hence, the large elective school board is passing away, the smaller and more efficient appointive board is taking its place. These appointive boards in our own State will prove one of the most important steps in the solution of the present confused and unsatisfactory condition of public education.

Perhaps its greatest need at present is for medical men, sanitarians and architects on the boards of education; men who, if not themselves experts, are competent to select experts, and to judge of their work. The plan now in vogue in Boston of hiring the best available architect, engineer, etc., in the city to supervise and construct all the school buildings should be adopted in every city, and should be extended to the employment of at least one thoroughly competent chief medical and sanitary inspector. This man should be responsible to the board of education, by whom he should be hired and discharged, and should have complete control of the sanitation and hygiene of the school buildings and of all the scholars. In the matter of ventilation, heating, drainage, playground space, control of athletic sports, hiring and discharge of physical and gymnasium directors and teachers, he should be in command, being subordinate only to the Superintendent of Schools and to the Board of Education. In other words, this matter of physical education and sanitation of schools and scholars can never be on a satisfactory and efficient basis until it is placed under a responsible and competent head.

The matter of the medical inspection of schools for the detection of contagious diseases, as at present conducted, is only a detail of the scheme which might be left in the hands of the Board of Health, or taken over by the Board of Education as circumstances and economy may dictate in each particular case. Every town having 2,000 or more school children should employ a chief medical officer of instruction at a yearly salary of not less than $3,500, who should give his entire time to the schools during the school year, and should supervise the playgrounds, and the out-of-door physical instruction during the summer. He should be allowed to employ as many nurses as might be needed at a compensation of $75 a month, and as many physical instructors, both male and female, as might be required. He should have charge of all the records and statistics bearing upon the physical condition of the children and the sanitation of the buildings. He should cause to be kept a card catalogue containing the physical history of each scholar, so that he might make a report on any one child, or any one thousand children, whenever he might be called upon to do so. He should also have charge of the instruction of the teachers in hygiene and physical education, should deliver lectures himself and be empowered to hire what help he might need in this department.

As Dr. Greenwood has ably demonstrated in his admirable reports of school inspection in Blackburn, England: the teachers are our first line of defense against contagious disease, against overwork, impure air, and all the deterrent influences which are injuring our children in school. That American teachers are, as yet, for the most part, in abyssmal darkness as regards these important matters, is a lamentable, but not irremediable state of affairs. Dr. Greenwood, with comparatively little trouble, having the support and co-operation of the school authorities behind him, has succeeded in a comparatively short time in enlisting the interest and sympathy of the teachers in the Blackburn schools, and a number of them prepared themselves and passed creditably examinations on hygiene and sanitation, thereby not alone earning better salaries and more responsible positions, but greatly improving and broadening their view of a teacher's duties and responsibilities, and strongly enhancing the pleasure and interest of their work.

Watching the human plant unfold and develop in a favorable environment, and careful study upon the means of improving and enlarging that environment, until the plant shall more and more nearly approach the perfection which the Great Author of our being intended us all to reach, is the great privilege of the teacher of children. Viewed from this standpoint, the teacher's calling is the noblest in the world.

Shall we not, as good citizens, do our part to render the teacher's work effective and satisfactory?

THE NECESSITY FOR SCHOOLS OF INSTRUCTION FOR PUBLIC HEALTH OFFICERS.

BY JOHN L. LEAL, M.D., PATERSON, N. J.

As I have already read, before this association, at least two papers upon this subject, it is not my intention to occupy very much of your time to-day. I shall not present to you a paper, but only a few suggestions, which will, perhaps, cause some criticism, and in that way increase the general interest of the association in one of the most important subjects which has ever been before it. I am perfectly willing to suffer the results of any criticism that may be aroused, if only it may result in the advancement of a good cause.

I take it that the committee, in formulating the title, intends the words "Health Officers" to include all those engaged in theoretical and practical public health work, although in this State the term is used legally and popularly as meaning the executive officers of health. It seems to me that there should be a very material difference in the

methods required for the education of the executive officers and those of whom professional knowledge is required in dealing directly with patients suffering from preventable disease, and the amount of knowledge required by them to fulfill their functions, and the methods employed in the education and training and the amount of knowledge required of subordinate officers performing purely mechanical functions.

As sanitary science, or public hygiene, or public health work is the science of the prevention of preventable disease and the spread thereof to the public, and as the science, and, indeed, the only science, which has to do with the knowledge of such disease in its various manifestations, is the science of medicine, it seems to me that, theoretically at least, the position of executive officer of health and all positions in which such disease is directly dealt with, should be filled by physicians. I am aware that such positions have been most satisfactorily filled by laymen, and, indeed, I know personally of such instances. I am also aware of the fact that the ordinary physician, gifted and proficient as he may be in other branches of the profession, is, as a rule, a lamentably poor sanitarian. For this, however, I do not hold the physician personally responsible. The fault lies with the methods of education, due to the greater attention paid to other branches of the profession. Individual physicians, whatever criticism may be due to the schools, have always realized the equal importance of their two-fold functions, which I should personally place in the following order: First, the prevention, and, second, the cure of disease. Sanitary science had its birth in this realization of individual physicians, and by their investigations and labors it has been brought to its present standing. Their labor, time and thought, devoted to the subject, have been unselfish, and the results have often been inimical to their material interests.

In this respect their position has been different from that of the members of other professions and vocations, brought in one way or another in close touch with sanitary science, in that their knowledge and training were, in the first place, absolutely necessary as a foundation for the science; and, in the second place, that the others have reaped material advantages as a result of their labors and of their alliance with the science which they—the physicians— have founded. Such others have been quick to see, not only the good accruing to the community by the protection of the public health in the prevention of disease, but it has also happened that in their efforts to further this most commendable cause, their own material interests have, incidentally, at least, not suffered.

In their zeal, and limited in their knowledge by the limitations of the time, these physicians discovered, as they believed, a most serious menace to the public health in the plumbing, drainage and sewerage systems which the luxury of advancing civilization demanded almost as a necessity.

No profession or trade more quickly were brought to the realization of these dangers, and no body of men ever made more strenuous efforts to avert them, than did the plumber. Incidentally, his bill to the house-

holder increased from 25 to 40 per cent. per annum. To-day the scientific sanitarian recognizes the error of his predecessor, and, perhaps, some of us our own. He knows that the public health would be far more benefited if this 25 to 40 per cent.. were expended upon the gas piping rather than upon the plumbing systems of dwellings. It is hard, however, to overcome the effects of error, and in most places plumbing codes adopted twenty years ago are still in existence.

The engineer was also an early convert to sanitary science. Actuated unquestionably by the desire to advance the public good, he developed a new and a very large field, the rewards acquired in which have been, incidentally, very gratifying. There can be no question of the value of the work accomplished in this field when scientifically directed. I would place the engineer, next to the chemist and the bacteriologist, as the most valuable aid to the true sanitarian. Neither can it be denied that sewerage systems have been constructed, filter plants have been built, and other engineering works of most expensive character have been undertaken, when the sought-for results could have been obtained by the following out of true sanitary laws upon far more economical and just as effective lines.

The non-medical bacteriologist and chemist have also stepped rapidly to the front, without the mental training, the habit of mind and the professional knowledge acquired in the study and practice of the medical profession—the root of sanitary science. They have practically formulated the principles of a science based almost solely upon purely theoretical knowledge and results obtained within the walls of laboratories.

Even the non-medical college professor (actuated by the importance of the subject and the vast benefit to mankind to be obtained through it), having left his chair which he has devotedly occupied from the time that he, on account of the theoretical and practical knowledge which he had acquired throughout his previous life by study and experiment in some other special branch of science, was called to it, has done his part, whether by the writing of text-books for the guidance of those who have been and are engaged in the practical work of sanitation, or by serving the public in the giving of testimony from the witness-stand.

It is always most gratifying to the medical worker in sanitary science to follow (as seems to be his tendency to do) these able representatives of other professions in their work, and to have his knowledge (which he should have acquired in his study and practice of his own profession) added to by these non-medical gentlemen.

It is always most interesting to him to study their books and listen to their disquisitions upon, we will say, such a subject as typhoid fever—a disease vitally affecting the public health. To be sure, he may have attended, examined, sat by the bedside of hundreds of cases of this disease and traced many of them to their source of infection, while the writer or speaker referred to has never seen such a case, but through his reading, the study of laboratory results and his own original thought, he is able, as it seems, to place his theoretical knowledge above the practical knowledge of the physician.

I cannot help believing, however, that these leaders of sanitary science would surpass even their present capacities had they had the training, the knowledge, theoretical and practical, and the habits of thought acquired by a medical education.

I am of the opinion, therefore, that the beginning of the professional education of all health officers, executive and those coming into immediate relations with preventable disease, should begin in the medical school. These schools should be forced to give to this branch of medicine the position in their curriculum that its importance demands. The degree of doctor of medicine, issued by any school of medicine, should include doctor of sanitary science. There should be clinical opportunities for this branch, as well as for the others, and his further practical experience could be acquired by the physician outside of the school, in the same way as he is forced to acquire experience in other branches of his profession.

The common argument used in favor of a lay executive health officer is that the physician is not, as a rule, a good business man, and that he can render better service in a subordinate position than at the head of a department of health. In answer to this I would say, in the first place, that many physicians are good executives and possess more than the average business ability. Many others are capable of acquiring it, if opportunity be given. In the second place, it is quite possible to devise means to relieve an executive officer of a great deal of the routine business administration, by conferring at least part of it upon the secretary, or some other designated officer. That the executive head, however, of any department of health of importance should be a medical man, I am fully convinced.

The subordinate officers, who come into immediate contact with disease, or who fulfil functions requiring medical knowledge, should, without doubt, also be physicians. I mean by this, those who make diagnoses, who inspect subjects, school children, etc., and those who take cultures, etc. The registrar should also be a physician, or at least should be under the direct supervision of a physician. All mortality reports issued should be vouched for by some physician who should be responsible therefor. The bacteriologist and the chemist should either be medical men, or should be under the supervision of a medical man. Under them should be the food, milk, drug inspection, etc.

Other subordinates in public health work do not need the same scientific education and training as the above, but they should be instructed in the general scientific principles of sanitary science, and should be so practically instructed in their own special functions as to be able to fulfill these functions in such a way as to obtain the very best results.

The importance of a proper training for the scientific technique for the taking of samples of water, food, milk, drugs, etc., the inspection of premises, disinfection, etc., cannot be overestimated, as upon these

details depends so much the actual results accomplished by the department.

Of the utmost importance is the general knowledge of the principles upon which this technique is based. The reasons why these are done in a certain manner; the ends sought for; the disinfection which may accomplish good, and that which is useless; the condition of a tenement-house which is dangerous to human life, and that which is not; the pile of dirt which may breed disease, and that which will not. The theoretical and practical knowledge must go hand-in-hand in order to secure the best results.

This State (acting principally through the efforts of this association) has not been backward in comparison with others; with one or two exceptions, in striving for the better education and training of those engaged in public health work.

The first step taken was the appointment of a board of examiners, by Rutgers College, in the year 1898. This board gave no instruction, nor was any special instruction given in connection with it, but it, twice each year, held examinations for the benefit of those applying to them, and issued certificates to those successfully passing the examinations. It probably accomplished some good in encouraging some of those already in the work to further study and effort, and also encouraged, to study some of those who were ambitious to enter upon the work, and were hoping to do so through the aid of the certificates issued by said board. The greatest weakness of the movement, however, was the lack of provision for inspection and training. The defect was fatal, and the board gradually ceased to exist.

The next step was the Act of 1903, requiring the holding of licenses by those engaged in public health work, and the institution of a board appointed by the State Board of Health, to examine applicants for such work. This was a much more important step in advance, and has accomplished, unquestionably, a great deal of good. There are several amendments required, however, to this act, and to other so-called Board of Health laws, which would place this State in a still better position.

First—I would suggest that in certain counties with no large cities, the towns of which are not populous and wealthy enough to pay for a proper health administration, that the local boards be superseded by county boards. In this way, unquestionably, a far better sanitary administration could be maintained than will be maintained by the present sanitary districts, sparsely settled and poor as they are.

Second—That in cases where the above will not apply, two or more adjoining towns be allowed to unite and form one sanitary district, so that by their united efforts a proper sanitary administration may be maintained, which could not be done by each one alone.

Third—That in the smaller and poorer sanitary districts, not able for one reason or another to take advantage of either of the two above outlined amendments, it be allowable to have at the head of their sanitary administration a subordinate health officer; that is, one not

necessarily holding a license as an executive officer of health, but an officer of lesser grade.

I do not approve of this last suggested amendment, except as a makeshift, but would far prefer bringing all the smaller sanitary districts in the State under one of the first two amendments.

The sanitary service of these smaller districts is of great importance, not only to the health of the inhabitants of these districts themselves, but also to the health of the inhabitants of other sections of the State. Much of the preventable disease existing in our cities today is brought to those cities from these outlying districts, and is due to the lack of proper sanitary supervision in those districts. There is no instance in which we are more our brother's keeper than in the matter of sanitary science, and it is of as much importance to the inhabitants of our larger cities that every section of our State should have proper sanitary supervision as that each and every city should possess it.

I have already expressed the opinion that the chief officer of a health department should be a physician. Practically, I would at least insist that no such license be given to any one except to one fulfilling the strictest requirements of such a position. I doubt very much if it is possible in this State, for us to provide the facilities required for the instruction of such men. I do believe, however, that it is far more important to us, and also possible, to provide for the instruction and training of men for the subordinate grades. That some such provision should be made seems self-evident, although as yet it has not been accomplished. A committee of your association has been in existence for several years and has endeavored in various ways to secure such facilities. The only institution in the State which has been willing to consider the taking up of the necessary courses is Rutgers College. This institution probably is also better situated to do so than any other, in connection with its Agricultural Department, which is supported by the State. The class of students which this school draws are also of the class which might be readily induced to take up the work of sanitary science.

Your committee has endeavored to make the necessary arrangements with this institution, but as yet has been unsuccessful. The stumbling block has been the estimated cost to the institution of the necessary courses. President Demarest says the cost will be several thousand dollars. Inasmuch as a large appropriation for another purpose was voted to Rutgers by the last Legislature, it was impossible then to accomplish anything in this line. Perhaps, however, it may be possible to reduce the large estimated amount and obtain a sufficient appropriation from the State at the next legislative session to carry on the work.

In order to obtain the practical instruction and training required, the only possible way, it seems to the committee, is to do so through the Newark Board of Health. This board, through its officers, its system and its equipment, is better able to give this instruction and training than is any other board in the State. We are encouraged

to hope that the necessary arrangements may be made through this board, but, of course, it is the sense of the committee that both theoretical and practical instruction should be given.

If the association sees fit to continue the committee, further efforts upon these lines will be made. However that may be, I trust that the association may realize the great importance of the subject, and may promote it to its utmost ability in whatever way may seem best to it.

THE NECESSITY OF THE BOVINE TUBERCULIN TEST.

BY EDWARD B. VOORHEES, SC.D., NEW BRUNSWICK, N. J., DIRECTOR OF THE N. J. AGRICULTURAL EXPERIMENT STATION, AT NEW BRUNSWICK.

The question of tuberculosis is now receiving more attention from medical men, from sanitarians, veterinarians, boards of health and others, either directly or indirectly connected with boards having to do with the public health, than any other one question, and rightly so, because it is one of the most insidious and fatal diseases. Fortunately, the work that is now being done by these various forces, both individually and collectively, is of such a character as to enable progress to be made along right lines. It is now a campaign of education, and the work must be continued and enlarged if we are to successfully compete with the ravages of the disease, to prevent its spread and provide for its cure and its final eradication.

Genuine progress in the suppression of the disease really began in 1882, when the nature of the disease was first determined through the discovery, by Prof. Robert Koch, of the parasite, the presence of which in the animal tissues causes those degenerations and growths of abnormal tissue known as "tubercles." This parasite is a bacterium or bacillus, a rod-like living organism, which, like other bacteria, grows and multiplies by feeding on the juices of the body, and reproduces by continual breaking into halves, each of which is a complete organism from its birth.

Because of the parasitic character of the disease and its method of development, ordinary physical methods of diagnosis are not capable of discovering the disease in all its stages, more particularly in the bovine family, the products of which were believed to be dangerous sources of infection. Hence, the later discovery, by Dr. Koch, in 1890, of a lymph made from the toxines of the tubercle bacilli and called "tuberculin," and which, injected into animals suffering with the disease, caused a rise of temperature and made it possible to diagnose

the presence of the disease in cattle in a much larger number of cases, and this discovery, together with the prevalent belief that the disease was transmitted to man through the milk of cows, encouraged a kind and degree of activity in the suppression of bovine tuberculosis, which was not warranted, and actually resulted in preventing for a longer time than was necessary the adoption of sane methods. Overzealous physicians, unscrupulous veterinarians, uneducated boards of health in towns and cities, in their anxiety to protect the public from the dread scourge, were responsible for the passage of laws and ordinances which were manifestly uncalled for and unwise at that time; they tended to create undue fear on the part of the public; to disturb economic relations and to stir up antagonism against proper methods, which conditions required many years to so far overcome as to make genuine rapid progress possible.

One of the chief factors which made for progress was the adoption of educational methods which, instead of antagonizing the owners of cattle, encouraged them to co-operate. The collection and dissemination of facts and figures, which showed them that so far as bovine tuberculosis was concerned it was not only a question of public health, but a question of sound economy on their part to co-operate in the suppression of the disease, and it is still along these lines that we must proceed, if we are to make that progress which will result in accomplishing the purpose, namely, the eradication of the disease from dairy cattle and thus stopping a prominent source of human infection.

In fact, the economic side of the question must even yet be made more prominent than the question of health of the human family, if we are to secure that helpful co-operation so necessary to rapid progress, because of the doubt that exists in the minds of certain leading scientists that the danger of direct transmission from animal to man is exceedingly slight, if it is likely to occur at all, when sanitary conditions of barns and stables are good.

The question, however, of the use of tuberculin is now practically settled. That is, it is the most reliable diagnostic agent that we have at the present time, and, if properly used, will result in detecting the disease in a majority of cases, and this without any danger of transmitting the disease, or causing its more rapid development and generalization, provided in all cases those making the test are fully familiar with its proper use and its limitations. That such is not now the case is generally acknowledged.

Its proper use depends upon a number of conditions, chief among which are:

(1) The reliability of the tuberculin itself; that is, its proper preparation and its use within such time after preparation as to make sure that its qualities are active.

(2) The general health and condition of the animal at the time of the injection—animals suffering with colds, those that have been unduly excited, or those that are naturally nervous or in any way abnormal may show reaction from the injection that may be due entirely to

these causes, and not to the presence of the disease. Those making the test should be familiar with these limitations, and also the necessity of the greatest care in the handling of the instruments, to sterilize these thoroughly in order to prevent infection of healthy animals.

(3) The influence of initial temperatures, as well as the time of the rise and its range, should also be fully understood. A lack of rise of two or three degrees of temperature is not always an absence of reaction if the initial temperature is high, nor does a rise of temperature the same number of degrees always indicate a reaction, provided the initial temperature is lower than normal. Many animals have been destroyed as diseased and many passed as healthy by those who are not thoroughly familiar with the test. Only experts should be permitted to make the tuberculin test.

The following illustration of the futility and danger of incompetent testing will make the point clear: A dealer in cattle brought from a neighboring State a carload of fresh dairy cows, and was selling them as tuberculin-tested. A buyer asked to see his test sheet. He willingly showed it, when the prospective buyer, after a glance, informed him that it was absolutely worthless. The cows had been injected at 9 o'clock P. M. and temperatures taken the next morning, at 7 and 8 A. M. There were no reactions, because the time for a rise in temperature had not arrived, yet all were passed. Subsequent injections showed a number of the animals to be badly diseased. These injections and readings were made by a graduate veterinarian of one of our leading schools. We see, therefore, that graduate veterinarians of our leading schools are not thoroughly familiar with the test, and many animals are reported as free from the disease when suffering with it, because of the improper use of the test. (See resolutions at end of paper.)

In the next place, the disease is of such a character as to make the test unreliable when germs have been recently introduced into the animal, and are still in a latent stage, and also less reliable where the disease has developed so far as to make the presence of the disease apparent upon physical examination.

In the first case the test will not discover the disease, because the parasites have not yet begun their active work; in the second place, as already intimated, the disease has proceeded so far as to make the injection of the lymph of no effect, although many cases of "open" tuberculosis are readily detected, either of the lungs or udder, by physical examination. Hence, in the examination of herds by the tuberculin test those animals that do not respond should be re-tested after a suitable period (two months or more), and those not reacting because of the advance of the disease should be immediately removed from the herd and destroyed.

With these statements as to the tuberculin test and the necessity of its use, I can now, I think, do no better than to describe briefly what has been and is being done by the present State Commission on Bovine Tuberculosis.

The law creating the Commission, whose work is limited to the investigation of the disease in dairy cattle, was passed in 1894. The preparation and passage of the law was the result of an investigation made by a committee appointed by the New Jersey State Board of Agriculture concerning the prevalence of the disease in this State. This law was not mandatory, but permissible, and provided for the examination of herds only upon the request of the owner, or of the State Board of Health, or State Dairy Commissioner. This act provided for the payment to the farmers of specified maximum sums for pure-bred and grade animals, and a certain proportion of this maximum amount to be paid to the farmer after post-mortem.

Later the law was amended, providing for the appraisement of all animals by duly-appointed appraisers, and the maximum sum being limited to $40; the owners to receive but three-quarters of the maximum appraisement. This law is now in force, and the results of its execution show that the knowledge that has now been gained by farmers of the contagious character of the disease and the liability of its rapid spread throughout entire herds, thus causing them direct loss, has encouraged them to notify the commission whenever they suspect the disease in their herd, so that the applications for examinations at the present time are much greater than in the beginning. In fact, the appropriations for the work of the Board, which is chiefly for the payment of veterinary inspection and payment for animals, has increased from $5,000 annually to over $20,000.

It was also realized soon after the law was established that some regulation should be made concerning the animals imported from other States, as the dairymen of New Jersey depend very largely upon purchased stock to replenish their herds. Hence, another law was passed, providing for the prevention of the introduction of animals from other States without their first having passed the tuberculin test, or providing for quarantine and test of such animals as are shipped into the State without being subjected to the tuberculin test. While this law has had a good effect, it has not prevented such introduction of animals, because the sum appropriated for the execution of the law is but $500; it does not provide for patrolling of the State lines, or for facilities for preventing the bringing into the State by express, by railroads and by driving in animals which have not been tested.

Furthermore, it is not possible, even with the law properly executed in other respects, to prevent the bringing into the State of animals that have not successfully passed the tuberculin test. This is not due to any defect of the law, but rather a defect in human nature, which is practically uniform everywhere, namely, that all people are not absolutely honest. It is possible to inject tuberculin into a diseased animal and have it shipped into the State, with certificate of health, or without such certificate, the re-injection to be made after arrival in quarantine; a re-injection shortly after the first will not cause a reaction, and in both cases the law is violated.

Furthermore, the law does not prevent the bringing into the State of animals that have latent tuberculosis, for, as already pointed out, unless the activities of the germ have begun, the disease will not be detected by the tuberculin test. Hence, unless animals of this kind are kept in quarantine for a considerable period and then tested, the re-injection will not cause their detection, and they may thus become centres of infection in other herds.

Since the work of the Commission began in 1894 there have been examined, up to November, 1907, 27,109 animals, of which 4,349, or 16 per cent., have been destroyed. In one sense the number destroyed is probably not a safe guide as to the prevalence of the disease among dairy cattle, because the herds that have been examined at the request of owners, who have made their application for the test because of palpable evidence of the disease, thus making the percentage of animals destroyed much larger than would be the case if all animals had been subjected to the test.

Fortunately, the Tuberculosis Commission has been composed of men who have a broad conception of the importaance of the economic side of the question, as well as that of the public health. They have, therefore, conducted their work quietly, efficiently and without such advertising as would create undue fear on the part of consumers of milk and an exaggerated idea of the widespread and injurious character of the disease, and, with few exceptions in the dairy centres, a disturbance of business has not been apparent.

The Commission has employed in its inspections only veterinarians of high standing, mainly those who are recent graduates of standard veterinary schools. These men have been a strong force in properly promoting the educational features of the work, first, because they are familiar with the conditions in their respective regions; they know the importance of the adoption of proper sanitary measures, as well as having a just knowledge of the changes that may be made to meet the requirements from the sanitary standpoint, without antagonizing the milk producers. It has been the policy of the Commission from the beginning to make such recommendations to owners of cattle as will result in improving the sanitary conditions of barns and animals, now regarded as of such vital importance if the milk is to be free from possible infections in the stable, recent investigations having shown that fecal matter is one of the most serious sources of infection.

To-day the farmers realize these points and stand ready and willing to make such changes as common sense and science demand. This is, in my judgment, one of the most fortunate features of the work, and has contributed much to the improvement of the relations between the Commission and the owners of cattle in relation to the inspection of herds by the State and municipal authorities.

In the beginning of the work the Commission succeeded in securing "permits," or "requests," from the owners of those herds that were manifestly badly diseased, and which, because of the high breeding or quality of the animals, were liable to be distributed throughout the

State, thus aiming to eliminate the disease in herds, which were liable to be the greatest disseminators of the disease to healthy herds. That this policy has resulted as well in very greatly improving the conditions in centres formerly notably bad, has been shown by the re-inspection of the herds in these neighborhoods. These re-inspections showing that the disease has been very largely eliminated from those regions.

A recent inspection of a large section of a dairy region, where it was possible to get practically all the owners to agree to have their herds tested, has shown that there are herds that are absolutely free from the disease, and but few have more than a small percentage of animals re-acting.

The point which so many radicals insisted upon in the beginning, namely, the destruction of all the re-acting animals, is still unsettled. It is manifest that a herd or a country cannot be made absolutely free of the disease unless all animals showing it are destroyed. Nevertheless, because of the economic side of the problem, that is, the usefulness of animals that are but slightly diseased, both as milkers and breeders, and because if the State is to pay for all animals destroyed the cost would be so enormous that it would be impossible to have legislation effected that would accomplish this, and because it is possible to quarantine animals in incipient stages of the disease and pasteurize the milk according to the Bang system, only those badly diseased are now destroyed.

This plan, while not providing for the destruction of all of the animals, would eventually result in their elimination. Hence, the policy of the Commission has been to destroy at once all animals that have "open" tuberculosis, and which are a direct menace to public health, and a certain source of contagion to other animals not having the disease, and to kill such others as may be useful for beef, on the request of the owners, and to, as far as possible, have the remainder quarantined and their product pasteurized.

The whole question of bovine tuberculosis is a serious one from all viewpoints. It is well worthy the careful consideration of State and nation, as well as of scientific investigators, physicians, veterinarians, health boards, breeders and shippers of cattle, producers and consumers of milk and meat, and, in fact, all classes of society—and the one great factor for the amalgamating of all of these interests and having them work together, shoulder to shoulder and intelligently, is education.

The resolutions referred to in the paper will be found on the next page.

The discussion of this paper by Dr. D. H. McAlpin and others will be found on pages 5–7.

COPY OF RESOLUTIONS ADOPTED AT THE FIRST ANNUAL MEETING OF THE EASTERN LIVESTOCK SANITARY ASSOCIATION,

Held at the Hotel Victoria, New York City, March 12th, 1908.

At this meeting, the States of Maine, New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, and Pennsylvania were represented.

Resolutions First Offered.

WHEREAS, The shipment from one State to another of tuberculous dairy cows and cattle for breeding purposes is a prolific means of spreading tuberculosis among animals, and

WHEREAS, It is difficult for the States, operating separately and independently, to control such shipments sufficiently to prevent the transfer of tuberculous cattle across their borders, be it

Resolved, That the Secretary of the U. S. Department of Agriculture is hereby requested to arrange, so fas as possible, for the inspection and tuberculin test, by agents of the Bureau of Animal Industry, of all dairy cows, cattle for breeding purposes, and working oxen moved into any State here represented.

Third Set of Resolutions.

WHEREAS, It appears that the results obtained in the inspection and testing with tuberculin of cattle for shipment from one state to another would be more satisfactory if a uniform method of applying the test were followed, therefore be it

Resolved, That the following be adopted as a standard to be followed in such cases:

1. A careful physical examination of each animal is to be made for symptoms of advanced tuberculosis and other diseases or conditions likely to affect the reliability of the test. 2. At least two preliminary temperature measurements are to be taken at regular intervals of two or three hours, preferably between three and nine P. M. 3. The temperature measurements are to be resumed within at least nine hours after the tuberculin is injected, and continued at regular intervals of two or three hours for at least sixteen hours in all cases, and in animals where the temperature is rising at the sixteenth hour, they shall be continued until a definite reaction occurs or until the temperature ceases to rise.

June 11, 1908. AUSTIN PETERS, *Secretary.*

METHODS OF ORGANIZATION IN THE TUBERCULOSIS CAMPAIGN.

BY WILLIAM C. SMALLWOOD, NEWARK, N. J.

Two and one-half years ago there was but one association in New Jersey dealing with the tuberculosis problem—to-day we have twenty-five committees in the State. That is an equal number with Massachusetts, with Massachusetts three and one-half years in the lead of us. The method of organization of these committees in the beginning, without precedent of organization, was somewhat defective, and in the past year, especially, we have been endeavoring to effect organizations through county medical societies, the county medical society giving impetus to the movement and adding such laymen as they may see fit. We found there was some friction on the part of committees formed by laymen exclusively. Each committee in the State is asked to deal with their own local problems. Problems differ in different communities, but a general outline has been laid down, and in most cases pretty thoroughly followed out. Some committees have been inactive in some respects. I am glad to say that the best committees are those that have had their impetus from within; that is, those who have decided to form a committee and gone ahead and done so, and then asked the assistance of the State Association—notably Plainfield, Orange, Summit and Montclair. That principle is clear enough, because if the desire is there, and the conditions warrant it, the growth is a pretty sure thing. The first thing we ask a committee to do is to place the tuberculosis State exhibit. This has now been placed in twenty cities. The problem is how to reach the smaller cities. There are many small communities that cannot afford to pay for placing the exhibit. The cost is from seventy-five to one hundred and twenty-five dollars, borne usually by boards of health or philanthropic citizens. We are endeavoring just now to get the State Board of Health to take up the problem of placing the exhibit in small communities. Last fall, I regret, we could not place it in all county fairs. The State Association placed it at the Inter-State Fair, Trenton, there reaching nearly one hundred thousand people. You can readily see that if the exhibit could be placed in small communities the educational feature would be secured. We regard the exhibit as a powerful educational feature. I have visited many towns where exhibits have been placed and watched people passing on the street come in and look and go away impressed. It not only means that they have seen the exhibit, but they go home and tell someone else about it.

Local committees asked for registration of all tuberculous cases, and a disinfection of all homes in which tuberculosis has existed, either at

time of death or on removal. These are the first principles in the tuberculosis campaign.

The one great feature in the problem of tuberculosis to-day is how to get hold of the incipient cases. To meet this we are asking committees to establish dispensaries throughout the State, and to employ visiting nurses, the nurse to go in the home and get an examination of the other members of the family, and to follow the known consumptive. Also we are endeavoring to awaken physicians to their responsibility in the matter. There was a time when physicians felt that when they had dealt with the known consumptive their task was finished, but to-day it is not the consumptive alone, but the other members of the family that need the attention of the physician, and we believe that by education better conditions will be brought about. It is only through education that we can hope to arouse the community, to arouse the individual to the point where if there is anything the matter with him he will secure the advice of the physician, and not wait until the disease has developed, but as in diphtheria or smallpox, get an examination of himself. As an instance of this education, at a dispensary opening in Boston, in six weeks three hundred visited the dispensary. Most of those were brought to the knowledge of the dispensary by the visiting nurses. One hundred of the patients who came had nothing the matter with them; that is, there was not discovered, on examination, any evidence of tuberculosis. It is an evidence of what Boston has done educationally in bringing these people to the dispensary of their own accord, and who went away satisfied that they did not have tuberculosis.

We are endeavoring to build up the general health of the community by the enforcement of sanitary laws. The work of the State Association is not to create new laws, but to create a public sentiment that will demand enforcement of those already existing. Certainly every town has sanitary laws that need enforcement. People grow lax and indifferent to laws. If a local committee were alive and active they would insist on such laws as non-spitting ordinances, etc. We ask that local committees get such an ordinance passed, and where the law exists we ask the enforcement of it. In a few communities in the State—the larger communities, like Orange, Paterson and Newark, and in some of the smaller communities—the committee are asking for the care and protection of the families in their homes. The enforced rest of the bread-winner, and the expense of special diet, will very often reduce a family to a state of want, and local committees are looking after the relief problem of a known tuberculous family. They also instruct the known consumptive on the care of those in their homes, advocating the sleeping on roofs, the addition of a small shack in the rear of the house and the opening of windows. I was impressed in Washington the other day with the fact that three or four known consumptives had been left almost to die alone because no one had felt it his duty to go and see them, and had been afraid to go. We do not want that condition to exist. Consumption is not a plague that you are going to catch by being kind to somebody.

We are advocating, not with any great degree of success as yet, the establishment of day camps. A small day camp was opened last summer in Newark, and it is very probable that other camps will be opened the coming summer. Steps have been taken in the Oranges, and also in Camden toward a camp. The possibility is that in Camden county there will be a permanent tuberculosis camp. In the beginning a great deal of stress was laid on sanatoria for incipient cases. When a State sanatorium was established the State felt that its duty was done, and the cases were provided for. The great danger lies in the advanced cases, and to-day there is no provision in New Jersey, except at Orange, for the advanced cases, excepting in the almshouse. We have to-day a sanatorium at Glen Gardner, taking care of one hundred and five incipient cases; one in Newark taking care of sixty-five, and one in Hudson county taking care of one hundred and twenty cases. The advanced case is left alone, and it is in these cases that the danger lies. Physicians are asking everywhere, what shall we do with the advanced cases? No, there is no place for them; well, then, I must let this woman die. There is no other way. So we need to arouse the State to the need of a hospital for advanced cases, and municipalities and counties to do something for them, and not to leave advanced cases as a menace to communities to die alone and unaided.

One of the important features of the work in which New Jersey is foremost and stands alone, is in the work in the public schools. A year and a half ago I took up the work with the State Board of Education of having a set of rules for prevention of tuberculosis prepared, and this year they are placed in eleven hundred school rooms in New Jersey. The subject of instruction to teachers is now being taken up by the State Association. I have talked in many counties at teachers' institutes. In several towns a tuberculosis day is being planned in the public schools, notably in Paterson, and early in January there are to be a score or more of persons to talk to pupils there, and in the evening a great mass meeting of parents and high school students is to be held in the public hall. So we are asking the local committees to emphasize the need of work among the public school children. We are just beginning to talk about the need of special schools for tuberculous children. In Providence and Boston the local committees have been able to get the school board to provide special schools for tuberculous children, employing the teacher and giving the same instruction as other children receive. I am hoping Montclair will take up that work. Montclair and Englewood have tuberculosis classes, and I am urging them to adopt the Providence and Boston plan of introducing special tuberculosis schools.

I think we need to recognize the danger of infection through bovine tuberculosis, and the need of enforcement of sanitary laws governing milk and dairy inspection. Those factors in the campaign have been very thoroughly dealt with this afternoon. I want to emphasize what Dr. Voorhees failed to say, that the article in McClure's Magazine is by Samuel Hopkins Adams and I want to urge everybody to read it.

I want to emphasize the responsibility of the State, the municipality and the individual in the tuberculosis campaign. The problem has grown too large for any local community or any private association to handle. When I came home from the National Congress, at Washington, where I was for ten days, I felt that all I had done ought to go in the waste basket; that I ought to begin over again; that it was of no use. I want everybody who is interested in the problem to go to New York and see the exhibit there, and go home feeling just as I do. I think then you will begin to realize how great the problem and responsibility of each individual is.

This year we are planning a great meeting in Trenton on February 16th, through which we hope to interest the Legislature to give a larger appropriation by which the State Board of Health will be able to more thoroughly handle this problem. It is the obvious duty of the State Board of Health to take this work well in hand. There are so few people in the State who are fighting this problem. I wish I could make you feel how alone I seem in this fight.

We need in New Jersey a law that will give us the right to remove the dangerous tuberculous patient to a place of safety, as is done in diphtheria and smallpox. Effective work toward the eradication of the disease cannot be accomplished until we have this law.

HOME AND SANATORIA TREATMENT OF TUBERCULOSIS.

BY SAMUEL B. ENGLISH, SUPERINTENDENT STATE SANATORIUM, GLEN GARDNER, N. J.

Constant intelligent oversight is essential to the persistent execution of rules and regulations necessary for the care of tuberculous patients.

The attention given by physicians to ambulatory patients, the condition of most of those in the early stage of the disease, when recovery is comparatively certain provided the rules for a cure be vigorously obeyed, is generally not sufficiently detailed. The fact that constant oversight is so essential led to the establishment of special sanatoria for consumptives, the success of which has caused their rapid multiplication. The first of these to be eminently successful in its results was established by Brehmer in Germany, and later by Trudeau of our own country.

Sanatoria now exist in all countries and climates, their success having demonstrated that recovery from tuberculosis is possible in every climate, though it must be admitted that in cold ones treatment

out of doors during the winter is less agreeable to patients and attendants, and more expensive because of the requisite wraps, clothing, etc.

In a sanatorium the patients constitute a colony in which all live the life that is as nearly ideal as possible for them, being constantly guided, watched and aided by resident physician and nurses. Each detail of their life is regulated, but nearly all being willing to subject themselves to the regulations and go through it together, it is not felt to be burdensome.

Not only is immediate good accomplished by such a regime, but lasting good also, by the education of the patients as to how to conduct their lives to effect recovery and remain well. This education is accomplished in part by the rules of the institution, and in a larger part by their rigorous execution, also by the example of what has been accomplished by others while resident therein.

Small or moderate sized institutions are to be preferred because in them individual patients are surest to receive the greatest amount of attention from supervising physicians.

In several sanatoria shacks have been erected, each accommodating from 15–20 single beds, and having abundant space between each, and about twenty feet deep; beds being so placed that they are sure to be protected by the roof from rains or snow, excepting in cases of storms of unusual severity from the South, when curtains must be lowered in front. Connected with the sleeping porches are comfortable sitting rooms, with bath and dressing rooms. However, more important than the building of a sanatorium is the regime, and most important of all are the character and ability of those who establish and govern it.

Patients in a sanatorium who have no fever, and in whose lungs the disease is not extensive, are awakened at 6:30 a. m. by attendants, when temperatures and pulses are taken, then given a cold bath, after which they are ready for the day. During the day they walk or take part in games or out-of-door sports as may be best adapted to each one.

Lunches of milk and eggs are served twice daily. These, with a full dinner and supper, at which all patients are helped generously and requested to eat what is given them, they are made to take on the average twice as much as they desire, which insures in most early cases a rapid gain.

Rest and exercise are prescribed each patient, and the effect on temperature and weight are carefully watched. Those patients having fever or suffering from complications as hemorrhages, pleurisy and the like are kept out of doors continuously, but quietly on beds or reclining chairs—nurses and fellow-patients preventing them from becoming lonely.

At stated periods thorough examinations are made of each patient, records being kept showing for better or worse any changes taking place. The mental attitude which patients acquire in a sanatorium is also most helpful. Their wants are provided for and they do not feel the strain always incident to caring for one's self, as is necessary at home. They see and know many who have improved, and knowing

this is due to the treatment which they are receiving, are correspondingly encouraged. The care which is taken to collect all sputum periodically, with the thorough sterilization or destruction of the same, is another way by which they are impressed with the necessity of doing for their own and others good.

The result is that in these colonies or communities there is less danger of transmitting the disease to others, or of spreading it to uninfected parts of their own lungs, than in any of our cities or towns where we may be as careful as one may. Moreover, as the patients live entirely out of doors, even the fine intangible, but often germ-laden spray which escapes in the air during talking and coughing, is so diluted and widely scattered by the wind that any organisms in it are so soon destroyed by exposure to sunshine and clear air that the danger of infecting others is reduced to a minimum. From this brief description it is evident that the relative value of sanatoria is entirely dependent upon the ability to control and guide the colony of sick people.

In the future State aid must be generously given to save the lives of hundreds who can be saved if only they have proper care for a sufficient length of time.

Patients going to a sanatorium should plan to stay at least six months, or a longer period in a majority of cases. It takes at least this long to establish an apparent recovery or very great improvement, or to learn by precept, guidance or example the lesson of how a consumptive must live in order to establish permanent good health. Many patients may return to work in six months, but a much larger number cannot do so for a year or more, and then have to accept employment less remunerative than that which they had when taken sick. Most sanatoria refuse to admit patients with consolidation, in other words, being willing to treat those who are surest to recover, and by this do the greatest good for the greatest number of patients.

It must be remembered that those patients who leave a sanatorium apparently well must, as nearly as possible, take the same care of themselves that they have been taught in the institution. The sanatorium should be looked upon as a place where patients are launched on the sea of recovery and are taught how to navigate to the hoped for port.

Physicians are often asked cannot patients be as well treated at home as in an institution?

It is frequently true that the outdoor treatment can be established there, and by the constant care and supervision of the trained nurse and physician that same care can be given. But tuberculosis mostly occurring among the poor or poverty-stricken, they are unable in any adequate degree to secure proper home treatment. In a majority of cases the patient, on account of his environment, is well nigh unteachable in the mode of extreme care necessary. There are however certain conditions of importance at the sanatorium that effect recovery that cannot exist at home.

It is rare that either patient or family can be freed from business or domestic cares if they do remain at home. This applies equally to one self-supporting or dependent. Moreover, the hopefulness coming from a residence in an institution known to have effected recoveries is wanting at home. This, with seeing other patients in all stages of improvement, make the sanatorium preferable.

The above objections to a properly conducted home treatment are not as applicable for children as adults. As a rule, however, home treatment is a most imperfect substitute for sanatorium treatment, and more especially is this true when a skilled nurse is not employed to watch and guide the half-well patient who feels able to do most things alone. Even with the nurse, such patients often assert themselves and break away from the regime which they should follow, being tempted by some social, business or household duty which they have been accustomed to perform. Attempts on the part of adults to recover at home are usually wasteful of the time which is most favorable for their recovery.

A patient must give himself up wholly to getting well. If he can do this recovery may be affected much more expeditiously in an institution than in a half-hearted sort of a way in his own home.

AFTER CARE OF THE DISCHARGED PATIENTS.

BY THEODORE SENSEMAN, ATLANTIC CITY, N. J.

In taking up the consideration of the treatment of the tubercular patient after discharge we are met with one of the most difficult problems connected with the entire subject. The discharged patient, with his sometimes real, but often only apparent renewed lease upon life, feeling better and stronger than for years before—perhaps such a sense of well being is not within his recollection—goes out from the sanatorium with a renewed hope and a determination to do and to be. He leaves behind the irksome restraint—the tiresome routine of the institution—forgets in the bright present the dark past, has no misgivings, no doubts concerning the future. And why after all should he doubt the future? Is he not cured—did not the doctor so tell him? How often has he heard of this cure? True it was called "clinical cure," but the word "clinical" means nothing to him—he is cured and that is all he cares about. This being so, why should he not live as other men? Why should he not take up his old life where he broke it off? Surely, since he is cured, he will be able to make up for the time lost during the enforced idleness while under treatment. And so he dives

in, throws restraint to the wind, takes up his old work, his former pleasures, and gradually drifts into the old bad habits of living which played such a large part in landing him in the institution in the first instance.

I maintain that these patients are promised too much; too much is said about this "clinical cure," when the most we ever accomplish is an arrested condition. The fallacy of these roseate promises to patients who judge from their feelings alone should be very apparent, for they can only raise in them a false hope—a dangerous and false assurance, and result in the frustrating, either entirely or in part, of any attempt at an after treatment. I am of the opinion that "once tubercular always tubercular" applies, with possibly an exception here and there, to all the cases treated in our institutions. By this I mean that when an individual develops tuberculosis and the disease becomes sufficiently far advanced to give marked symptoms, all we can accomplish is an arrested condition. We are able only to assist the organism in the establishment of that ratio between the toxins and anti-toxins which will insure the cessation of symptoms. But granted that we cannot cure these cases, it does not follow that they will all die of tuberculosis—as a matter of fact the majority will not, and many will never have a recurrence of the symptoms. Nevertheless, they still have the germ—the infiltrated area—perhaps the cavity in their lungs, but their resistance remains stronger than the disease and its toxins, and they live their lives the hosts of a weak and almost inactive family of the T. B. Now it can readily be seen that so long as this state of affairs exists the patient is practically just as well off as though he never had tuberculosis at all, for this is really what we mean by the term good health; being free from disease does not necessarily mean being free from the cause of disease, for who is there among us who has not constantly with him the germs of disease, but it does mean that our organisms have sufficient reserved energy to meet and destroy these germs as they find their way into our bodies. And so it is with tuberculosis—we do not entirely eradicate the disease, for we cannot kill off all the germs and spores—the lung lesion once present is never entirely healed, and hence all we can hope for is to crowd the disease with its bacilli into a corner and hold them there, and it is the necessity of maintaining this state of affairs which makes the after-treatment so necessary and so important.

I have repeatedly seen patients who have left institutions in apparently fine condition—a typically healthy human being to all appearances, a so-called "clinical cure"—have a recurrence of the symptoms within a short time after their discharge. When such a recurrence occurs it is called a reinfection, when in reality it is simply a lowering of the resistance of the individual, thus allowing the toxins of the already existing infection to get the upper hand, and these recurrences are always more serious—are harder to deal with than the initial condition.

If the cure of the tubercular patient means the raising of the resistance of the organism so that anti-toxins or anti-toxic bodies may be manufactured in sufficient quantities as to counteract the toxins of the disease-producing germs (and this, I think, will be readily granted) then the after-treatment simply means the keeping up of this resistance—in other words, the patient to keep well should follow the same plan which he used to get well, although modified according to the individual requirements. He should therefore see to it that his nourishment is kept up as near as is possible to the standard required during the treatment period at the institution, that the indigestible articles of food should be avoided by him, and he should be thoroughly impressed with the fact that in order to preserve his lungs he must first preserve his digestion. He should closely follow his weight increase, his nourishment, and decrease his exercise when below what should be his normal. I do not believe as a rule in advising patients to take their own temperature and pulse, and yet such advice given to the right person may be a very valuable safeguard and constitute a very important factor in the after-treatment.

Certainly these discharged patients should be advised to visit their physician at regular intervals in order that he may closely watch for the first suspicious sign of a recurrence of the former symptoms. It is a mistake to send patients out from an institution, no matter how good their condition may appear to be at the time, and allow them to follow their own heads and direct their own treatment. They should always be under the direction of a skilled medical adviser until such time has elapsed as will assure the physician that they have safely checked the disease. This may be one year, or it may be ten years, and in my opinion it should be ten years more often than one.

The question of paramount importance connected with the after-treatment is the one of selecting a suitable work or business—for we must remember that we are dealing with individuals who must work if they would live. Many of them are the main support of a family, which during the patient's enforced idleness has been living upon generous friends and relations, or suffering the trials of privation. Such a patient leaving an institution with the knowledge that he has spent the nest-egg which for years, perhaps, he has been laying aside, perhaps going out facing a larger debt than he has ever known before, cannot be blamed if he loses sight of everything else. The inherent manhood within him forces him, against his better judgment, into the strife and turmoil of the money-getting world. And so many of them make the fatal mistake of choosing the wrong kind of work, which in many instances quickly costs them a recurrence of the symptoms, and ultimately their life. It is right here that our institutions supported by the profession at large should step in. These patients should be warned in no uncertain terms of the dangers of such a course, they should be advised and urged to go slow and take such work as is suitable for them, even though the compensation be less and their term of indebtedness prolonged thereby. While we thus advise the patient

it is also important that we state the true condition of affairs to the patient's family. Unless we do this what would appear to the patient as a proper discretion, to his family would appear as laziness. The discharged patient going back to his home a picture of apparent perfect health—perhaps the strongest and healthiest looking member of the household—is naturally expected to take up his share of the home burdens, and the rest of the household feel that since they worked for him while he was sick, now that he is well, he should work for them, and thus in ignorance they perhaps drive and nag him into doing that which he was instructed not to do.

This naturally brings us to the question, what is the ideal employment for the discharged tubercular patient? I cannot, of course, enter into this part of the subject in detail as each tubercular patient is a law unto himself, and what one can do with ease the other cannot do at all, but as a rule I would say that any light work which will keep the patient almost constantly in the fresh air is the proper employment for him. Such positions are hard to find for these people, and this fact offers an excellent opportunity for the various societies interested in the crusade against tuberculosis. It is just as important to care for what might be called the "well tubercular" as it is to help the "sick tubercular," and if more interest could be taken in the endeavor to find suitable positions for the first class, not only could immeasurable good be done for them, but at the same time another step in preventing the increase of the second class would be taken, and after all prevention is the goal to which we are all aiming.

THE WASHINGTON, D. C., AQUEDUCT AND FILTRATION PLANT.

BY E. D. HARDY, C.E., MEMBER AMERICAN SOCIETY OF CIVIL ENGINEERS.

For nearly half a century the water supply of Washington, D. C., has been taken from the Potomac river, at Great Falls. At this point a dam has been built, which holds the water at an elevation of 150.5 feet above mean tide at Washington. From Great Falls, the water flows for a total distance of 16½ miles through a conduit nine feet in diameter, two reservoirs and a tunnel to the McMillan Park reservoir by gravity. From McMillan Park reservoir it is pumped to the filters. After passing the filters, it flows to the filtered water reservoir and later to the city mains.

Conduit.—Beginning at Great Falls, the conduit was built on a uniformly descending slope of 9¼ inches per mile. As the country

through which it passed was quite broken and irregular, it was necessary to tunnel through the hills and to carry it across the valleys either on bridges or earthen embankments. The principal tunnel work occurs at the upper end of the conduit, where for a distance of about 2,000 feet it was blasted out of solid rock. This section has never been lined and still retains its rough and irregular shape. The principal bridge is the one across Cabin John creek. This bridge is a masonry arch having a clear span of 220 feet, and was for many years the longest span masonry arch in existence. Although there are several other bridges, they are comparatively small and uninteresting.

Across twenty-six valleys the conduit was carried over culverts and earthen embankments. For the greater part of the remaining distance it winds along the Maryland side of the river following the general direction of the contour, which gives it the required elevation. Here it was built in open cut. After backfilling the trench, its upper surface was macadamized and is now known as the Conduit Road.

Reservoirs.—In its passage from Great Falls to the Filtration Plant, the water ordinarily passes through three reservoirs. These are known as the Dalecarlia, Georgetown and McMillan Park reservoirs. They have a capacity of 141, 140 and 265 million gallons respectively. Their available capacity is considerably less, however, as it is neither practicable nor desirable to drain them completely.

Tunnel.—The connecting link between the Georgetown and McMillan Park reservoirs is a tunnel about 4½ miles in length. It was blasted out of solid rock, and passes below the city at a depth varying between one and two hundred feet. This tunnel has a horseshoe shaped cross section of 76 square feet in area. After passing through the tunnel, the water enters the McMillan Park reservoir. This reservoir is the last one in the series of sedimentation reservoirs. It is situated in McMillan Park near the filtration plant, and supplies the plant with water.

The filtration plant consists of twenty-nine covered, slow-sand filter beds having an effective area of one acre each. The water to be filtered is taken from McMillan Park reservoir. It is lifted about twenty-one feet by means of centrifugal pumps and forced through the influent pipes to the filters. It then passes slowly downward through the filter sand to the underdrainage system, from which it is carried through cast-iron pipes to the regulator houses and later to the filtered water reservoir. The pumping station contains three thirty-six inch Worthington centrifugal pumps, each operated by a directly connected tandem compound steam engine. Each pump has a capacity of at least 40 million gallons per day. In addition to these pumps, there are two 2½ million gallon pumps which are used for supplying water under a high pressure for washing and transporting the filter sand, and two engines for operating the generators which furnish power for the machine shop and light for the filters and various buildings connected with the plant.

Each of the filters contains 3½ feet of fine sand. This sand is supported by one foot of broken stone, graded from fine to coarse, so that

its upper layer is fine enough to prevent the sand from penetrating it, and the lower layer of such size that the water may flow very freely through it in any direction. In this lower layer of coarse broken stone drain tiles are laid with open joints. These tiles are laid in parallel lines fourteen feet apart, across the filter. Each line of tiles empties into a 24 inch central underdrain running below and lengthwise of the filter. This central drain discharges into a cast-iron pipe which carries the filtered water to the regulator houses.

The regulator houses contain the necessary valves, meters, and drains for operating, regulating, refilling and measuring the water from each bed. After passing through the regulator houses, the water passes directly to the 15-million gallon filtered water reservoir. The filtered water reservoir is similar in construction to the filters. It has a floor, side and end walls, and also a covering supported on piers. All the work is of concrete, and is covered with two feet of earth for protection against heat and frost. From this reservoir the water flows by gravity to the low, and is pumped to the high areas of the city.

The Dalecarlia and Georgetown reservoirs were completed in 1859. Dalecarlia reservoir was formed by building a dam across a small stream known as Little Falls Branch. This stream furnished the water supply of Washington until the completion of the conduit to Great Falls in 1863. After that date the water supply was a mixture of the two until 1888, when the water from Little Falls Branch was excluded. During the time occupied in building a canal and tunnel to carry the water from Little Falls Branch around the Dalecarlia reservoir, or between 1888 and 1896, this reservoir was out of service. In 1902 the McMillan Park reservoir and a tunnel between it and the Georgetown reservoir were completed and put into service. From that time until the filtration plant was completed the city was supplied with a mixture of the water from Georgetown and McMillan Park reservoirs.

Construction of the Filters.—The site selected for the filters is situated just south of the Soldiers' Home grounds. At the time it was purchased it had been subdivided, partially graded and some of the streets built. It was, therefore, quite expensive, the price paid being 45 cents per square foot, or a total of nearly $700,000. Unfortunately, this land was very irregular and required a large amount of grading. It was necessary to excavate to a depth of 35 feet on one side and to fill a valley which was 30 feet below the required elevation on the other. The cost of this grading amounted to over $300,000, so that about $1,000,000 were spent before the work of placing the real filter structures was begun.

In these structures over 100,000 cubic yards of concrete were placed, and the rate of progress of this work depended largely on the efficiency of the concrete mixing and handling plant. The sand and gravel for the concrete were delivered in bottom dump cars and dumped into a hopper from which they were elevated and carried to the bins by belt conveyors. The concrete was mixed in three Smith mixers. It was then carried on cars to the cable ways, and by means of these cable ways it completed its journey to the point where it was required.

The first step in this construction was to place concrete around the 24-inch central underdrain which is located below the filter floor. The floor was then laid in alternate blocks and carefully screened to parabolic sections. After the floor had been completed the wooden forms for the piers and walls were assembled and carefully secured in place. These forms were then filled with concrete.

A few days later this concrete had become so hard that the forms were removed, and those for the vaulting were put in place. After the concrete vaulting had been completed the man-holes were built, and the structures were then ready to receive the two feet of earth covering which was placed to protect them from great changes in temperature and to support the grass and shrubs which were afterward added to give the plant a pleasing appearance. One of the most prominent features of the plant is the sand bins. They were provided simply for the purpose of storing the clean sand after it passes through the sand washers. While these bins are not considered to be things of beauty they have enabled the officials in charge of this plant to carry on the operation of sand handling at a lower unit cost than has been the case for almost any other plant in the world.

The main work of constructing the filtration plant was begun in May, 1903, and practically completed in September, 1905. A few of the beds were put into service in August, 1905. Other beds were gradually added to this number until on October 5th, 1905, enough filters were in service to filter the entire water supply of Washington. Since that date every gallon of water which has been used for any purpose, whether for drinking or turning water motors, has been filtered. The plant has now been in full operation for three years, and during that time a large amount of data have been collected regarding the condition of the raw and filtered water. A summary of these data are given in tables Nos. 1 to 4.

From table No. 1 it may be seen that the average reduction in turbidity between the Potomac river at Great Falls and the filtered water reservoir is 98 per cent. It will also be noticed that the filtered water generally contains a small amount of turbidity. This condition is one that was predicted by the late Col. Miller and also by a commission of experts consisting of Messrs. Hering, Fuller and Hazen before the work of designing the plant was begun. It is one that could easily be remedied, and the necessary steps to be taken to remedy it have been pointed out on various occasions by the commission referred to above and by the officials in charge.

An exhaustive series of experiments have been carried on during the last two years, and these experiments clearly show that the use of a coagulent for a few days during each year will so clarify and change the character of the raw water that it can be satisfactorily treated with the slow sand filters. While the occasional appearance of turbidity in the filtered water has been a source of annoyance to the employees at the plant, who naturally wish to secure a perfect water, I do not believe the consumers have been particularly disappointed with the water as it has been supplied to them.

In the discussion of a paper presented to the American Society of Civil Engineers, Dr. Woodward, Health Officer of Washington, said: "The writer knows of no evidence that indicates even that the very plant that has been constructed has not given satisfactory results when gauged by the standard of bacterial efficiency, and the only evidence that has ever come to his knowledge that it has not yielded an effluent satisfactorily clear has come from those concerned in the operation of the plant, who appear to have been dissatisfied at times because they were unable to attain the high standard of brilliancy in the effluent that they have set before them. The public seems to be satisfied."

The average number of bacteria per c. c. by months in the water at Great Falls and in the various reservoirs are shown in table No. 2. From this table it will be seen that when compared with the water supplied many other cities, the Potomac river at Great Falls is not badly polluted. The bacterial content varies widely and is subject to very sudden changes. No doubt there are traces remaining of pollution from various points along the shores of the river, but the volume of water is large and the principal sources of pollution are far removed. A large percentage of the harmful organisms die before reaching the intake, others settle out with the silt in the three reservoirs, and it is believed that the few which reach the filters are removed by them. The bacterial efficiency of the system, including the reservoirs and the filters, is noticeably greater in the summer than in the winter months. The numbers of bacteria in the filtered water are invariably low during the warm weather. As a general rule this is also true for cold weather, but, with the large numbers in the raw water and cold weather at the same time, we have learned to expect comparatively large numbers in the filtered water.

The Washington filtration plant has been subjected to considerable adverse criticism because a large reduction in the typhoid death rate did not occur soon after it was put in operation. This, I may say, was a surprise to the officials in charge. They fully expected to see a marked improvement, and when it did not appear they began to try to locate the reason why it did not come. A well-equipped laboratory for water anaylsis was fitted out during the construction of the plant and a competent force of chemists and bacteriologists employed. After sufficient data had accumulated, it was noticed that the filters were quite efficient and that their introduction had greatly improved the water. It was also noticed that the filters were more efficient during the summer months, while the typhoid situation was at its worst. On plotting the typhoid curves for many years, it was found that they were quite uniform in general appearance and similar to the temperature curve. These facts led us to believe that the water supply had not been as important a factor in the causation of typhoid as had been previously supposed. The bad reputation of the water still persisted, however, among the doctors and people generally.

After October 5th, 1905, the entire water supply was filtered. No decrease in the typhoid death rate was noticeable either immediately or

during the following year. In fact, the death rate was somewhat higher, and in July, 1906, so great an increase occurred that Dr. Woodward, Health Officer of the District of Columbia, considered it necessary to take steps towards a thorough investigation of the situation. As Dr. Woodward had neither a bacteriological laboratory nor a sufficient force of assistants to make this investigation, Walter Wyman, Surgeon-General, Public Health and Marine Hospital Service, was invited to co-operate. A thorough investigation was made under the direction of Dr. M. J. Rosenau, Director of the Hygienic Laboratory, and a valuable report on the origin and prevalence of typhoid fever in the District of Columbia was submitted in February, 1907.

In that report all the ordinary sources of infection were considered and commented upon in detail. Regarding the water supply, the authors seem to be in doubt, as may be seen from the following extract: "In view of the foregoing, it is evident that at the present time it is not possible to present conclusive proof as to the part played by the Potomac river water in the spread of typhoid fever in the District of Columbia. Therefore, the Board reserves final decision on this subject until investigation, now in progress at the Hygienic Laboratory, have been completed." In May, 1908, after continuing the study of the quality of the water supply, a second report on the same subject appeared.

The conclusions in that report were as follows:

"1. Much of the typhoid fever in the District of Columbia is imported. 2. Many cases in the District of Columbia are contracted through contact with persons, or with articles handled or soiled by persons in the febrile stage of the disease. The especial prevalence of the disease among children in the District of Columbia probably has an important bearing on the spread of the infection by contact. 3. Infected milk is one of the important known factors in the spread of the disease in the District of Columbia. 4. The filtered Potomac river water during the typhoid season of 1907 (May to September) was, according to present bacteriologic standards, of good sanitary quality, and, so far as could be ascertained, was not responsible for the spread of the infection.

In the typhoid season of 1907 there were about 200 cases less than in the 1906 period. This improvement in the situation suggests that the diminution in the amount of typhoid fever in the District of Columbia was due to the improvement in the quality of the drinking water as the result of sand filtration. Positive proof of this can now be established. However, a careful study of typhoid fever in the District of Columbia for the next three to five years will throw much light on the role played by the Potomac river water in previous years."

From the foregoing quotations it would seem that while the bad name given to the Potomac river water dies hard, it improves upon closer acquaintance and more rigid and careful analyses.

In the course of two evenings, which were devoted entirely to the above subject, the Medical Society of Washington practically exoner-

ated the filtered Potomac water, and since that time the Health Office and medical profession generally look to other sources of infection than the water supply.

TABLE NO. 1—TURBIDITY.

AVERAGES BY MONTHS.

		Reservoirs.			
Month.	Great Falls.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1905.					
October,	36	21	18	11	1
November,	19	19	14	11	1
December,	199	84	74	39	6
1906.					
January,	94	60	60	52	12
February,	45	41	29	22	3
March,	272	181	56	46	6
April,	167	72	58	46	7
May,	56	20	16	10	2
June,	303	125	94	41	2
July,	130	54	47	43	3
August,	375	112	66	45	2
September,	35	34	28	25	2
October,	127	37	24	21	1
November,	27	20	16	13	1
December,	69	31	28	26	2
1907.					
January,	135	70	75	53	7
February,	26	15	16	17	2
March,	248	77	70	57	4
April,	47	33	30	24	2
May,	29	18	15	9	1
June,	104	48	32	18	1
July,	114	61	47	31	1
August,	73	35	26	14	0
September,	129	..	51	28	0
October,	32	..	28	26	0
November,	97	..	45	23	1
December,	135	..	61	46	4
1908.					
January,	202	73	82	65	7
February,	302	52	52	32	4
March,	91	78	68	42	4
April,	23	41	27	20	2
May,	172	48	37	20	1

Month.	Great Falls.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1908.					
June, ...	40	29	24	18	1
July, ...	149	74	44	15	0
August, ...	129	73	56	39	1
September, ...	24	..	19	18	0
	—	—	—	—	—
Average, ...	121	56	43	30	2.6
Per cent. of reduction,...		54	64	75	98

TABLE No. 2—BACTERIA PER CC.

AVERAGES BY MONTHS.

Reservoirs.

Month.	Dalecarlia Inlet.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1905.					
October, ...	.....	.....	.....	207	78
November, ...	.....	.....	.....	153	27
December, ...	.....	15,637	17,884	3,750	60
1906.					
January, ...	.....	.....	15,719	1,520	39
February, ...	2,916	4,086	1,823	562	16
March, ...	1,803	1,105	883	654	19
April, ...	3,310	1,658	715	399	22
May, ...	429	206	94	66	17
June, ...	7,887	4,628	334	224	17
July, ...	13,779	607	486	156	26
August, ...	8,658	1,077	1,231	188	14
September, ...	422	245	136	133	14
October, ...	2,303	949	640	268	16
November, ...	1,818	1,124	1,176	224	12
December, ...	6,902	3,772	3,646	700	45
1907.					
January, ...	4,415	2,372	2,214	936	68
February, ...	997	932	1,022	691	45
March, ...	11,533	8,295	7,154	3,614	64
April, ...	3,687	2,125	1,429	467	21
May, ...	769	339	324	131	26
June, ...	2,325	978	594	99	18
July, ...	2,680	580	340	160	17
August, ...	3,000	280	420	80	17
September, ...	6,200	*	1,880	230	32
October, ...	1,390	*	933	283	27
November, ...	8,862	*	6,552	1,506	27
December, ...	16,050	*	9,643	4,270	192

Month.	Dalecarlia Inlet.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1908.	*				
January, ...	11,206	8,680	9,394	3,734	195
February, ...	11,766	5,962	5,013	2,762	76
March, ...	4,633	3,960	2,948	1,283	30
April, ...	688	447	247	124	13
May, ...	9,461	1,076	631	335	17
June, ...	741	122	113	97	12
July, ...	4,883	.....	398	152	8
August, ...	1,645	326	296	103	12
September, ...	322	.....	199	78	11
Average, ...	7.899	2.651	2.838	.843	.37
Per cent. of reduction, ...		.....	42	83	99.

* Out of service

TABLE NO. 3.—TESTS FOR BACILLUS COLI.

FOR FISCAL YEAR ENDING JUNE 30TH, 1906.

	Cubic centimeters.	Total Samples Examined.	No. Positive.	Percentage Positive.
Great Falls or Dalecarlia inlet,....	10	108	38	35
	1	108	21	19
	1/10	108	10	9
Dalecarlia outlet, ...	10	155	62	40
	1	155	36	23
	1/10	155	8	5
Georgetown reservoir, ...	10	121	32	26
	1	121	18	15
	1/10	121	2	2
McMillan Park reservoir, ...	10	169	41	24
	1	169	14	8
	1/10	169	3	2
Filtered water reservoir, ...	100	76	4	5
	10	171	4	2
	1	171	3	2
	1/10	93	0	0
Tap water from various parts of city,	10	80	1	1
	1	80	0	0
	1/10	59	0	0

FOR FISCAL YEAR ENDING JUNE 30TH, 1907.

	Cubic centimeters.	Total Samples Examined.	No. Positive.	Percentage Positive.
Great Falls or Dalecarlia inlet,....	10	156	96	61
	1	156	68	44
..	1/10	156	30	19
Dalecarlia outlet, ...	10	130	75	58
	1	130	38	29
	1/10	130	16	12
Georgetown reservoir, ...	10	131	67	51
	1	131	39	30
	1/10	131	14	11
McMillan Park reservoir, ...	10	292	95	33
	1	292	38	13
	1/10	292	4	1
Filtered water reservoir, ...	10	292	13	4
	1	292	6	2
Tap water from various parts of city,	10	523	28	5
	1	523	5	1

FOR FISCAL YEAR ENDING JUNE 30TH, 1908.

Great Falls or Dalecarlia inlet,....	10	307	137	45
	1	307	96	31
	1/10	307	40	13
Dalecarlia outlet, ...	10	65	21	32
	1	65	8	12
	1/10	65	2	3
Georgetown reservoir, ...	10	122	42	34
	1	122	27	22
	1/10	122	5	4
McMillan Park reservoir, ...	10	351	78	22
	1	351	33	9
	1/10	351	5	1
Filtered water reservoir, ...	10	351	10	3
	1	351	1	1
Tap water from various parts of city,	10	705	24	3
	1	705	7	1

Table No. 4.—Summary of Sanitary Chemical Analyses of Weekly Samples by Years.

Year ending June 30th, 1906.

(Results given in parts per million.)

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	223	0.032	0.244	0.276	0.0033	0.79	....	....	2.
Dalecarlia outlet,	96	.029	.152	.181	.0028	.78	....	....	1.7
Georgetown reservoir outlet,	53	.016	.124	.140	.0033	.77	....	....	1.7
McMillan Park reservoir outlet,	31	.015	.073	.088	.0028	.79	60	51	1.6
Filtered water,	4	.010	.041	.051	.0004	.92	60	51	1.6

Year ending June 30th, 1907.

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	147	0.030	0.204	0.234	0.0030	0.93	62	54	2.1
Dalecarlia outlet,	52	.032	.158	.190	.0035	.98	64	56	2.1
Georgetown reservoir outlet,	44	.019	.114	.133	.0039	1.04	64	56	2.0
McMillan Park reservoir outlet,	31	.017	.083	.100	.0034	1.05	62	54	1.7
Filtered water,	3	.013	.058	.071	.0001	1.08	63	54	1.8

Year ending June 30th, 1908.

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	89	0.011	0.120	0.131	0.0050	0.58	58.2	53.6	2.1
Dalecarlia outlet,	51	.017	.095	.112	.0060	.54	60.5	54.0	2.1
Georgetown reservoir outlet,	43	.010	.098	.108	.0050	.56	58.5	53.8	1.0
McMillan Park reservoir outlet,	29	.005	.054	.059	.0050	.61	61.3	52.2	1.9
Filtered water,	2	.006	.033	.039	.0004	.71	60.5	53.2	1.8

Table No. 4a.—Standards Which May be Considered as Representative Analyses of Wholesome Water.

Nitrogen as Ammonia. Free.	Albuminoid.	Nitrogen as— Nitrates.	Nitrates.	Chlorine.
0.010 to 0.120	0.100 to 0.280	0.0030 to 0.0135	0.00 to 1.04	3 to 10

TABLE No. 5.—*Continued.*

(A) Table showing number of deaths from Typhoid Fever, by months, in the District of Columbia for the twelve fiscal years preceding June 30th, 1908.

Month.	1896 and 1897	1897 and 1898	1898 and 1899	1899 and 1900	1900 and 1901	1901 and 1902	1902 and 1903	1903 and 1904	1904 and 1905	1905 and 1906	1906 and 1907	1907 and 1908	Monthly Averages.
July,	8	10	24	9	20	16	21	17	16	15	21	10	15.6
August,	15	16	22	38	41	33	39	26	22	30	32	18	27.7
September,	25	18	22	30	29	28	25	18	25	23	21	17	23.4
October,	25	10	28	28	25	21	32	19	14	26	25	19	22.7
November,	18	9	21	27	28	22	19	8	11	14	17	11	17.1
December,	16	18	16	26	17	16	20	14	9	6	4	7	14.1
January,	13	8	10	17	7	19	9	5	11	6	7	4	9.7
February,	4	4	4	6	2	8	5	5	1	4	6	1	4.2
March,	4	2	7	8	8	12	9	6	5	5	4	1	5.8
April,	4	9	6	10	2	9	6	10	7	4	6	8	6.7
May,	6	6	3	5	4	13	6	8	1	10	7	8	6.4
June,	9	20	6	12	10	9	3	8	3	9	2	3	7.8
Total,	147	130	169	216	193	206	194	144	125	152	152	107	....

(B) Preceding Table of Typhoid Deaths reduced to death rates per 100,000 inhabitants per year.

Month.	1896 and 1897	1897 and 1898	1898 and 1899	1899 and 1900	1900 and 1901	1901 and 1902	1902 and 1903	1903 and 1904	1904 and 1905	1905 and 1906	1906 and 1907	1907 and 1908	Average Monthly Death Rate
July,	35	43	102	37	82	64	83	66	61	56	69	35	61.1
August,	65	69	93	158	167	132	153	100	83	111	105	64	108.3
September,	109	78	93	125	118	112	98	69	95	85	69	60	92.5
October,	109	43	119	116	102	84	126	73	53	97	82	67	89.2
November,	78	39	89	112	114	88	75	31	42	52	56	39	67.9
December,	70	78	68	108	69	64	79	54	34	22	13	25	57.0
January,	56	34	42	69	28	75	35	19	41	22	24	14	38.3
February,	17	17	17	24	8	31	19	19	4	15	20	4	16.2
March,	17	8	29	33	32	47	35	23	19	18	13	4	23.2
April,	17	38	25	41	8	35	23	38	26	15	20	28	26.2
May,	26	25	12	20	16	51	23	30	4	36	24	28	24.6
June,	39	85	25	49	40	35	12	30	11	33	7	11	31.4
Annual death rate,	53	46	59	74	65	68	63	46	39	47	42	32	....

TABLE No. 6.—PUMPING STATION.

(Daily Average by Months.)

Month.	Ave. No. Mil. Gal. Pumped to Filters.	Ave. Lift to Filters in Feet.	Ave. No. Mil. Gals. Sand Wash Water Pumped at 100 lbs. Pressure.	Pounds of Coal Burned.	Duty of Plant Per 100 lbs. of Coal Burned.
1905.					
Oct.,	67.94	23.3	....	19,382	68.9
Nov.,	66.06	21.55	....	17,198	69.4
Dec.,	67.20	21.46	....	19,899	60.4

Month.	Ave. No. Mil. Gal. Pumped to Filters.	Ave. Lift to Filters in Feet.	Ave. No. Mil. Gals. Sand Wash Water Pumped at 100 lbs. Pressure.	Pounds of Coal Burned.	Duty of Plant Per 100 lbs. of Coal Burned.
1906.					
Jan., ...	65.27	21.56	....	20,659	57.2
Feb., ...	68.15	21.22	....	20,264	61.1
Mar., ...	64.27	20.82	.136	18,494	61.2
Apr., ...	62.70	21.54	.512	19,212	60.9
May, ...	65.63	21.13	.618	20,334	62.7
June, ...	67.82	22.78	.914	23,288	63.9
July, ...	69.18	23.78	1.470	27,151	62.5
Aug., ...	68.03	24.49	.640	23,574	66.2
Sept., ...	69.82	23.89	.659	25,054	62.0
Oct., ...	69.14	23.77	1.070	27,043	60.2
Nov., ...	65.51	21.13	.305	22,578	55.8
Dec., ...	65.71	21.44	.202	22,813	55.5
1907.					
Jan., ...	67.62	20.81	.327	23,815	54.1
Feb., ...	74.68	21.76	.183	25,126	56.8
Mar., ...	64.23	22.60	.180	22,456	56.5
Apr., ...	63.45	20.86	.287	22,117	54.4
May, ...	62.47	20.83	.177	19,378	58.9
June, ...	63.53	20.74	.158	18,968	60.7
July, ...	68.64	23.02	.143	21,048	64.4
Aug., ...	67.74	23.77	.187	21,750	64.1
Sept., ...	68.93	23.79	.346	24,442	60.3
Oct., ...	66.46	23.19	.364	23,208	60.0
Nov., ...	61.54	20.84	.241	20,661	56.5
Dec., ...	62.29	21.09	.335	20,898	58.0
1908.					
Jan., ...	63.36	20.67	.444	21.307	57.6
Feb., ...	68.17	22.45	.323	21,314	62.8
Mar., ...	59.63	20.72	.389	19,991	57.1
Apr., ...	61.51	21.14	.432	20,458	58.6
May, ...	62.96	22.95	.313	21,492	60.4
June, ...	67.96	22.79	.362	21,703	64.0
July, ...	71.08	25.05	.486	24,431	66.1
Aug., ...	68.14	24.00	.446	23,151	65.0
Sept., ...	65.83	22.85	.530	23,089	61.4
	2,382.65	799.78	13.179	787,746	2,185.6
Average,	66.18	21.66	.425	21.882	60.7

Table No. 7.—Cleaning Filters.

TOTAL COST PER MILLION GALLONS.

Month.	No. of Filters Cleaned.	Average Duration of Runs in Days.	Millions of Gallons Filtered During Run.	*Total Cost Per Million Gallons.* Average Cost of Cleaning.	Average Cost of Pumping.	Average Cost of Office and Laboratory.	Average Total Cost.
1905.							
Oct., ...	13	49	146	$0.63	$0.90	$0.43	$1.96
Nov., ..	12	45	136	0.58	0.94	0.53	2.05
Dec., ...	5.25	51	172	0.40	0.98	0.54	1.92
1906.							
Jan., ...	4	69	233	0.36	1.38	0.74	2.48
Feb., ...	2⅔	104	332	0.33	1.14	0.59	2.06
Mar., ...	4¾	130	552	0.51	1.16	0.61	2.28
Apr., ...	7	149	366	0.76	1.34	0.74	2.84
May, ...	8½	130	298	0.79	1.01	0.59	2.39
June, ..	11	124	297	1.05	1.54	0.59	3.18
July, ...	18.6	70	180	1.57	1.15	0.54	3.26
Aug., ..	2	49	138	2.57	1.37	0.67	4.61
Sept., ..	5.5	73	205	1.03	1.36	0.56	2.95
Oct., ...	23	82	229	1.54	1.14	0.74	3.42
Nov., ..	7.5	37	120	1.07	1.39	0.62	3.08
Dec., ...	8	62	181	0.97	1.52	0.60	3.09
1907.							
Jan., ...	9	78	286	0.84	1.14	0.60	2.58
Feb., ...	3	92	298	0.60	1.10	0.60	2.30
Mar., ...	3	93	275	0.86	1.25	0.61	2.72
Apr., ...	10	104	309	1.19	1.15	0.82	3.16
May, ...	4⅔	95	292	0.58	1.19	0.71	2.48
June, ..	2	109	417	1.07	1.14	0.73	2.94
July, ...	21	89	223	0.55	1.25	0.85	2.65
Aug., ..	12	43	122	0.46	1.30	0.66	2.42
Sept., ..	34	33	86	0.88	1.23	0.74	2.85
Oct., ...	21	27	82	1.26	1.15	0.85	3.26
Nov., ..	18	36	101	0.96	1.29	0.83	3.09
Dec., ...	21	31	83	1.30	1.40	0.88	3.58
1908.							
Jan., ...	22	31	82	1.61	1.63	0.86	4.10
Feb., ...	5	64	181	0.82	1.29	0.71	2.82
Mar., ..	12	64	181	1.00	1.49	0.80	3.29
Apr., ...	15	66	162	1.72	1.19	1.26	4.17
May, ...	5	69	167	1.67	1.14	0.84	3.65
June, ...	27	45	121	1.16	1.71	1.07	3.94
July, ...	29	18	59	0.80	1.15	0.75	2.70
Aug., ...	25	26	80	0.99	1.25	0.70	2.94
Sept., ..	21	23	69	1.18	1.16	0.79	3.13
	452.42	2460	7261	35.66	44.92	25.75	106.33
Ave., ...	12.5	68	202	.99	1.25	.71	2.95

THE PROGRESS OF THE MOSQUITO EXTERMINATION WORK IN NEW JERSEY.

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When, five years ago, I appeared before this body for the first time I considered it necessary to go into some detail in relation to the standing of the mosquito to sanitary science. The agency of the mosquito in the transmission of malaria and yellow fever was by no means generally accepted at that time, and was questioned in the discussion that followed my paper. Very little was known of the manner of transmission, even to the medical profession at large, while the layman had only the haziest notion on the subject. Since that time progress has been made by leaps and bounds. The agency of insects in the transmission of diseases looms up ever more large, and the position of the mosquito as a nuisance and as a danger to health is firmly established.

In New Jersey the campaign against the mosquito has not been so much to check the spread and development of malaria as to render habitable those sections that the mosquito has, to a large extent, rendered uninhabitable, and the fight has been less against *Anopheles* than it has been against the species of *Culex:* primarily, those that breed on the salt marshes, and next against those that breed close to our houses and make life miserable indoors.

On the occasion of my previous lecture I told what was known about the general habits of mosquitoes, and illustrated the character of the work that was being done on the salt marshes. At that time the State was not committed to any systematic campaign. An appropriation had been made for the study of the problem, but beyond that matters had not gone. Since that time the State has taken action and has declared all mosquito-breeding places to be a nuisance, abateable as such by local boards of health. For this item of progress members of this association were largely responsible, and, indeed, members of this association have given me most efficient aid in my work against this pest. At that time mosquito work had been done on the Shrewsbury river, and a little of it had been done by Newark and Elizabeth. I was able to show pictures of the work carried on on the Shrewsbury marshes, and of that done by machine at Newark and at Elizabeth.

Great progress has been made since the State made its appropriation of three hundred and fifty thousand dollars in 1906. As a matter of fact, only $45,000 were actually made available up to the beginning of the present fiscal year, and with that amount we have cleared out all the salt marsh from Jersey City to the head of Barnegat bay. It

should be noted that the large cities, Jersey City, Newark and Elizabeth, have contributed nobly toward this work, and the two first-named cities have paid nearly, or quite all, of the bill for the work on the marshes within their jurisdiction.

At the present time the work is being carried on along the west shores of Barnegat bay, and before winter fully sets in I expect that Dover township, in which Lakewood is situated, will be completed, and that the work will be done to Toms River. Another stretch of the shore line that has been completed is the twelve-mile strip from Barnegat Junction south to the new inlet, on which Beach Haven is the principal settlement.

Progress has been made, not only in the territory covered, but in the manner of doing the work. The total acreage treated up to November 1st, 1908, is 17,620. The total number of feet of ditching is 2,394,174. Under contract at the present time, or done since the first of November, are over 2,000 acres in addition, with 300,000 feet of ditching.

In the progress of our work the first improvement that was made was in the manner of putting in ditches on the salt marshes. Instead of using the long-bladed spades that were found so useful on the Shrewsbury river, bog-saws were resorted to to cut the sides of the ditches, and long-handled spades and forks were used to take out the sods between them. This gave us deeper and cleaner ditches, and it was possible to get more of them in the course of a day. The next improvement was in the line of a huge spade invented by Edwin M. Skinner, of Staten Island, which cut the sides of the ditches and took out a full depth of sod at one time. This was a very effective, but a very heavy tool, requiring three men to manage it, and cutting from five to eight hundred feet a day with a trained gang. This kept the cost of the work down in spite of the increased cost of labor, and some very pretty and effective ditching was put in in Woodbridge township with this tool.

Another one of our contractors, Mr. Jesse P. Manahan, designed a lighter tool, all metal, which could be run by two men as rapidly and as effectively as the Skinner tool could be run by three men, and Mr. Manahan thus gained a little advantage over Mr. Skinner in the price of work. This Manahan spade proved extremely useful and very effective, and has been in continuous use since the time it was first introduced on the marshes at Secaucus. It is possible with this spade to dig a ten-inch ditch, thirty inches deep and take out a sod six inches in length, which can be laid at the side of the ditch in position and in perfect shape. Five to six hundred feet by two men is the capacity of this spade in straight-away work, and double-width ditches can be dug just as easily as those of single width, and that is a thing that could not be done with the Skinner spade. Hand tools, therefore, were very materially improved, and in this way the cost of making the ditches has been kept down in spite of the increased cost of labor.

In addition to that, the machines for ditching have also been im-

proved. The original True ditcher, as I found it in Massachusetts, was a very light affair, and the first machine that was put upon the marshes at Newark and afterward at Elizabeth was intended to dig a very narrow ditch and only two feet in depth. We found by practical experience that two feet was not quite deep enough. Six inches more improved the capacity of our ditches very materially, and gave them a drainage area much greater than those only two feet deep. Wherever possible, therefore, we make our ditches thirty inches deep, and we have found that in ordinary salt marsh such ditches will pull the water a distance of 100 feet on each side of them, so while we started with the idea that the ditches would probably have to be about sixty feet apart, we find now that it is possible to put them 200 feet apart, and to secure satisfactory effects where the ditches themselves are not over ten inches wide. There is some terrirtory, of course, where the ditches must be placed much more closely; but I am talking now of an average salt marsh. We have now six machines in use. All of them weigh, at least, three times as much as the first machines that were put on the meadows, and all of them capable of running 4,000 feet of ditching a day under favorable conditions. It requires a crew of five men to run a machine on ordinary salt marsh.

As to the effectiveness of the work, that is in some places most remarkable, and has produced a total change in the character of the meadow. Not only does the surface dry out and become solid enough so that mowing machines may be taken now where, three or four years ago, it was not even possible to walk without hip boots; but the character of the grasses has changed very materially. The sedges are disappearing and black grass is gradually coming in. Where the meadows have been drained longest the crops have increased enormously, and in some places four tons an acre of good salt hay is being harvested where, three or four years ago, nothing at all was taken off, or only a mixed lot of hay of inferior value. In addition to that the meadows are becoming more level. There is no rotting from standing water, and, under normal conditions, all the rain that falls on the meadow is taken up by the surface and appropriated without adding very much to the water in the ditches. On the other hand, the ditches being all connected with tide water, keep up a constant circulation in the meadow, so that the meadow never dries out completely. This produces the best possible condition for the growth of grasses, and the only objection to our work is that there are not ditches enough for the best interests of the meadow, even if there are sufficient to take off surface water.

A very interesting problem came up when we had the shore strip between Barnegat Junction and the new inlet to deal with. This whole strip is sand, and only on the western side, where it faces the bay, was there any true salt marsh. The sod on this marsh is shallow and lies on a bed of sand. Our ditches necessarily were shallow also, because there was no use in going below the sand layer upon which the sod rested. Nevertheless, the sod drained perfectly. We found, however,

Month.	Great Falls.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1908.					
June, ...	40	29	24	18	1
July, ...	149	74	44	15	0
August, ...	129	73	56	39	1
September, ...	24	..	19	18	0
	—	—	—	—	—
Average, ...	121	56	43	30	2.6
Per cent. of reduction,...		54	64	75	98

TABLE NO. 2—BACTERIA PER CC.

AVERAGES BY MONTHS.

Reservoirs.

Month.	Dalecarlia Inlet.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1905.					
October, ...	.....	.....	.....	207	78
November, ...	.....	.....	.....	153	27
December, ...	.....	15,637	17,884	3,750	60
1906.					
January, ...	.....	.....	15,719	1,520	39
February, ...	2,916	4,086	1,823	562	16
March, ...	1,803	1,105	883	654	19
April, ...	3,310	1,658	715	399	22
May, ...	429	206	94	66	17
June, ...	7,887	4,628	334	224	17
July, ...	13,779	607	486	156	26
August, ...	8,658	1,077	1,231	188	14
September, ...	422	245	136	133	14
October, ...	2,303	949	640	268	16
November, ...	1,818	1,124	1,176	224	12
December, ...	6,902	3,772	3,646	700	45
1907.					
January, ...	4,415	2,372	2,214	936	68
February, ...	997	932	1,022	691	45
March, ...	11,533	8,295	7,154	3,614	64
April, ...	3,687	2,125	1,429	467	21
May, ...	769	339	324	131	26
June, ...	2,325	978	594	99	18
July, ...	2,680	580	340	160	17
August, ...	3,000	280	420	80	17
September, ...	6,200	*	1,880	230	32
October, ...	1,390	*	933	283	27
November, ...	8,862	*	6,552	1,506	27
December, ...	16,050	*	9,643	4,270	192

Month.	Dalecarlia Inlet.	Dalecarlia Outlet.	Georgetown Outlet.	McMillan Park Outlet.	Filtered Water.
1908.	*				
January, ...	11,206	8,680	9,394	3,734	195
February, ...	11,766	5,962	5,013	2,762	76
March, ...	4,633	3,960	2,948	1,283	30
April, ...	688	447	247	124	13
May, ...	9,461	1,076	631	335	17
June, ...	741	122	113	97	12
July, ...	4,883	.....	398	152	8
August, ...	1,645	326	296	103	12
September, ...	322	.....	199	78	11
Average, ...	7.899	2.651	2.838	.843	.37
Per cent. of reduction, ...		.....	42	83	99.

* Out of service

TABLE No. 3.—TESTS FOR BACILLUS COLI.

FOR FISCAL YEAR ENDING JUNE 30TH, 1906.

	Cubic centimeters.	Total Samples Examined.	No. Positive.	Percentage Positive.
Great Falls or Dalecarlia inlet,....	10	108	38	35
	1	108	21	19
	1/10	108	10	9
Dalecarlia outlet, ...	10	155	62	40
	1	155	36	23
	1/10	155	8	5
Georgetown reservoir, ...	10	121	32	26
	1	121	18	15
	1/10	121	2	2
McMillan Park reservoir, ...	10	169	41	24
	1	169	14	8
	1/10	169	3	2
Filtered water reservoir, ...	100	76	4	5
	10	171	4	2
	1	171	3	2
	1/10	93	0	0
Tap water from various parts of city,	10	80	1	1
	1	80	0	0
	1/10	59	0	0

FOR FISCAL YEAR ENDING JUNE 30TH, 1907.

	Cubic centimeters.	Total Samples Examined.	No. Positive.	Percentage Positive.
Great Falls or Dalecarlia inlet,	10	156	96	61
	1	156	68	44
	1/10	156	30	19
Dalecarlia outlet,	10	130	75	58
	1	130	38	29
	1/10	130	16	12
Georgetown reservoir,	10	131	67	51
	1	131	39	30
	1/10	131	14	11
McMillan Park reservoir,	10	292	95	33
	1	292	38	13
	1/10	292	4	1
Filtered water reservoir,	10	292	13	4
	1	292	6	2
Tap water from various parts of city,	10	523	28	5
	1	523	5	1

FOR FISCAL YEAR ENDING JUNE 30TH, 1908.

Great Falls or Dalecarlia inlet,	10	307	137	45
	1	307	96	31
	1/10	307	40	13
Dalecarlia outlet,	10	65	21	32
	1	65	8	12
	1/10	65	2	3
Georgetown reservoir,	10	122	42	34
	1	122	27	22
	1/10	122	5	4
McMillan Park reservoir,	10	351	78	22
	1	351	33	9
	1/10	351	5	1
Filtered water reservoir,	10	351	10	3
	1	351	1	1
Tap water from various parts of city,	10	765	24	3
	1	765	7	1

TABLE No. 4.—SUMMARY OF SANITARY CHEMICAL ANALYSES OF WEEKLY SAMPLES BY YEARS.

YEAR ENDING JUNE 30TH, 1906.

(Results given in parts per million.)

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	223	0.032	0.244	0.276	0.0033	0.79	....	....	2.
Dalecarlia outlet,	96	.029	.152	.181	.0028	.78	....	....	1.7
Georgetown reservoir outlet,	53	.016	.124	.140	.0033	.77	....	....	1.7
McMillan Park reservoir outlet,	31	.015	.073	.088	.0028	.79	60	51	1.6
Filtered water,	4	.010	.041	.051	.0004	.92	60	51	1.6

YEAR ENDING JUNE 30TH, 1907.

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	147	0.030	0.204	0.234	0.0030	0.93	62	54	2.1
Dalecarlia outlet,	52	.032	.158	.190	.0035	.98	64	56	2.1
Georgetown reservoir outlet,	44	.019	.114	.133	.0039	1.04	64	56	2.0
McMillan Park reservoir outlet,	31	.017	.083	.100	.0034	1.05	62	54	1.7
Filtered water,	3	.013	.058	.071	.0001	1.08	63	54	1.8

YEAR ENDING JUNE 30TH, 1908.

	Turbidity.	Nitrogen as Ammonia. Free.	Albuminoid.	Total.	Nitrogen as— Nitrites.	Nitrates.	Hardness.	Alkalinity.	Chlorine.
Dalecarlia inlet,	89	0.011	0.120	0.131	0.0050	0.58	58.2	53.6	2.1
Dalecarlia outlet,	51	.017	.095	.112	.0060	.54	60.5	54.0	2.1
Georgetown reservoir outlet,	43	.010	.098	.108	.0050	.56	58.5	53.8	1.0
McMillan Park reservoir outlet,	29	.005	.054	.059	.0050	.61	61.3	52.2	1.9
Filtered water,	2	.006	.033	.039	.0004	.71	60.5	53.2	1.8

TABLE No. 4a.—STANDARDS WHICH MAY BE CONSIDERED AS REPRESENTATIVE ANALYSES OF WHOLESOME WATER.

Nitrogen as Ammonia. Free.	Albuminoid.	Nitrogen as— Nitrates.	Nitrates.	Chlorine.
0.010 to 0.120	0.100 to 0.280	0.0030 to 0.0135	0.00 to 1.04	3 to 10

TABLE No. 5.—*Continued.*

(A) Table showing number of deaths from Typhoid Fever, by months, in the District of Columbia for the twelve fiscal years preceding June 30th, 1908.

Month.	1896 and 1897	1897 and 1898	1898 and 1899	1899 and 1900	1900 and 1901	1901 and 1902	1902 and 1903	1903 and 1904	1904 and 1905	1905 and 1906	1906 and 1907	1907 and 1908	Monthly Averages.
July, ...	8	10	24	9	20	16	21	17	16	15	21	10	15.6
August, ...	15	16	22	38	41	33	39	26	22	30	32	18	27.7
September, ...	25	18	22	30	29	28	25	18	25	23	21	17	23.4
October, ...	25	10	28	28	25	21	32	19	14	26	25	19	22.7
November, ...	18	9	21	27	28	22	19	8	11	14	17	11	17.1
December, ...	16	18	16	26	17	16	20	14	9	6	4	7	14.1
January, ...	13	8	10	17	7	19	9	5	11	6	7	4	9.7
February, ...	4	4	4	6	2	8	5	5	1	4	6	1	4.2
March, ...	4	2	7	8	8	12	9	6	5	5	4	1	5.8
April, ...	4	9	6	10	2	9	6	10	7	4	6	8	6.7
May, ...	6	6	3	5	4	13	6	8	1	10	7	8	6.4
June, ...	9	20	6	12	10	9	3	8	3	9	2	3	7.8
Total, ...	147	130	169	216	193	206	194	144	125	152	152	107	....

(B) Preceding Table of Typhoid Deaths reduced to death rates per 100,000 inhabitants per year.

Month.	1896 and 1897	1897 and 1898	1898 and 1899	1899 and 1900	1900 and 1901	1901 and 1902	1902 and 1903	1903 and 1904	1904 and 1905	1905 and 1906	1906 and 1907	1907 and 1908	Average Monthly Death Rate
July, ...	35	43	102	37	82	64	83	66	61	56	69	35	61.1
August, ...	65	69	93	158	167	132	153	100	83	111	105	64	108.3
September, ...	109	78	93	125	118	112	98	69	95	85	69	60	92.5
October, ...	109	43	119	116	102	84	126	73	53	97	82	67	89.2
November, ...	78	39	89	112	114	88	75	31	42	52	56	39	67.9
December, ...	70	78	68	108	69	64	79	54	34	22	13	25	57.0
January, ...	56	34	42	69	28	75	35	19	41	22	24	14	38.3
February, ...	17	17	17	24	8	31	19	19	4	15	20	4	16.2
March, ...	17	8	29	33	32	47	35	23	19	18	13	4	23.2
April, ...	17	38	25	41	8	35	23	38	26	15	20	28	26.2
May, ...	26	25	12	20	16	51	23	30	4	36	24	28	24.6
June, ...	39	85	25	49	40	35	12	30	11	33	7	11	31.4
Annual death rate, ...	53	46	59	74	65	68	63	46	39	47	42	32	....

TABLE No. 6.—PUMPING STATION.

(Daily Average by Months.)

Month.	Ave. No. Mil. Gal. Pumped to Filters.	Ave. Lift to Filters in Feet.	Ave. No. Mil. Gals. Sand Wash Water Pumped at 100 lbs. Pressure.	Pounds of Coal Burned.	Duty of Plant Per 100 lbs. of Coal Burned.
1905.					
Oct., ...	67.94	23.3	....	19,382	68.9
Nov., ...	66.06	21.55	....	17,198	69.4
Dec., ...	67.20	21.46	....	19,899	60.4

Month.	Ave. No. Mil. Gal. Pumped to Filters.	Ave. Lift to Filters in Feet.	Ave. No. Mil. Gals. Sand Wash Water Pumped at 100 lbs. Pressure.	Pounds of Coal Burned.	Duty of Plant Per 100 lbs. of Coal Burned.
1906.					
Jan., ...	65.27	21.56	....	20,659	57.2
Feb., ...	68.15	21.22	....	20,264	61.1
Mar., ...	64.27	20.82	.136	18,494	61.2
Apr., ...	62.70	21.54	.512	19,212	60.9
May, ...	65.63	21.13	.618	20,334	62.7
June, ...	67.82	22.78	.914	23,288	63.9
July, ...	69.18	23.78	1.470	27,151	62.5
Aug., ...	68.03	24.49	.640	23,574	66.2
Sept., ...	69.82	23.89	.659	25,054	62.0
Oct., ...	69.14	23.77	1.070	27,043	60.2
Nov., ...	65.51	21.13	.305	22,578	55.8
Dec., ...	65.71	21.44	.202	22,813	55.5
1907.					
Jan., ...	67.62	20.81	.327	23,815	54.1
Feb., ...	74.68	21.76	.183	25,126	56.8
Mar., ...	64.23	22.60	.180	22,456	56.5
Apr., ...	63.45	20.86	.287	22,117	54.4
May, ...	62.47	20.83	.177	19,378	58.9
June, ...	63.53	20.74	.158	18,968	60.7
July, ...	68.64	23.02	.143	21,048	64.4
Aug., ...	67.74	23.77	.187	21,750	64.1
Sept., ...	68.93	23.79	.346	24,442	60.3
Oct., ...	66.46	23.19	.364	23,208	60.0
Nov., ...	61.54	20.84	.241	20,661	56.5
Dec., ...	62.29	21.09	.335	20,898	58.0
1908.					
Jan., ...	63.36	20.67	.444	21.307	57.6
Feb., ...	68.17	22.45	.323	21,314	62.8
Mar., ...	59.63	20.72	.389	19,991	57.1
Apr., ...	61.51	21.14	.432	20,458	58.6
May, ...	62.96	22.95	.313	21,492	60.4
June, ...	67.96	22.79	.362	21,703	64.0
July, ...	71.08	25.05	.486	24,431	66.1
Aug., ...	68.14	24.00	.446	23,151	65.0
Sept., ...	65.83	22.85	.530	23,089	61.4
	2,382.65	799.78	13.179	787,746	2,185.6
Average,	66.18	21.66	.425	21.882	60.7

TABLE NO. 7.—CLEANING FILTERS.

TOTAL COST PER MILLION GALLONS.

Month.	No. of Filters Cleaned.	Average Duration of Runs in Days.	Millions of Gallons Filtered During Run.	*Total Cost Per Million Gallons.* Average Cost of Cleaning.	Average Cost of Pumping.	Average Cost of Office and Laboratory.	Average Total Cost.
1905.							
Oct., ...	13	49	146	$0.63	$0.90	$0.43	$1.96
Nov., ..	12	45	136	0.58	0.94	0.53	2.05
Dec., ...	5.25	51	172	0.40	0.98	0.54	1.92
1906.							
Jan., ...	4	69	233	0.36	1.38	0.74	2.48
Feb., ...	2⅔	104	332	0.33	1.14	0.59	2.06
Mar., ...	4¾	130	552	0.51	1.16	0.61	2.28
Apr., ...	7	149	366	0.76	1.34	0.74	2.84
May, ...	8½	130	298	0.79	1.01	0.59	2.39
June, ..	11	124	297	1.05	1.54	0.59	3.18
July, ...	18.6	70	180	1.57	1.15	0.54	3.26
Aug., ..	2	49	138	2.57	1.37	0.67	4.61
Sept., ..	5.5	73	205	1.03	1.36	0.56	2.95
Oct., ...	23	82	229	1.54	1.14	0.74	3.42
Nov., ..	7.5	37	120	1.07	1.39	0.62	3.08
Dec., ...	8	62	181	0.97	1.52	0.60	3.09
1907.							
Jan., ...	9	78	286	0.84	1.14	0.60	2.58
Feb., ...	3	92	298	0.60	1.10	0.60	2.30
Mar., ...	3	93	275	0.86	1.25	0.61	2.72
Apr., ...	10	104	309	1.19	1.15	0.82	3.16
May, ...	4⅔	95	292	0.58	1.19	0.71	2.48
June, ..	2	109	417	1.07	1.14	0.73	2.94
July, ...	21	89	223	0.55	1.25	0.85	2.65
Aug., ..	12	43	122	0.46	1.30	0.66	2.42
Sept., ..	34	33	86	0.88	1.23	0.74	2.85
Oct., ...	21	27	82	1.26	1.15	0.85	3.26
Nov., ..	18	36	101	0.96	1.29	0.83	3.09
Dec., ...	21	31	83	1.30	1.40	0.88	3.58
1908.							
Jan., ...	22	31	82	1.61	1.63	0.86	4.10
Feb., ...	5	64	181	0.82	1.29	0.71	2.82
Mar., ..	12	64	181	1.00	1.49	0.80	3.29
Apr., ...	15	66	162	1.72	1.19	1.26	4.17
May, ...	5	69	167	1.67	1.14	0.84	3.65
June, ...	27	45	121	1.16	1.71	1.07	3.94
July, ...	29	18	59	0.80	1.15	0.75	2.70
Aug., ...	25	26	80	0.99	1.25	0.70	2.94
Sept., ..	21	23	69	1.18	1.16	0.79	3.13
	452.42	2460	7261	35.66	44.92	25.75	106.33
Ave., ...	12.5	68	202	.99	1.25	.71	2.95

THE PROGRESS OF THE MOSQUITO EXTERMINATION WORK IN NEW JERSEY.

JOHN B. SMITH, SC.D., ENTOMOLOGIST.
NEW BRUNSWICK, N. J.

When, five years ago, I appeared before this body for the first time I considered it necessary to go into some detail in relation to the standing of the mosquito to sanitary science. The agency of the mosquito in the transmission of malaria and yellow fever was by no means generally accepted at that time, and was questioned in the discussion that followed my paper. Very little was known of the manner of transmission, even to the medical profession at large, while the layman had only the haziest notion on the subject. Since that time progress has been made by leaps and bounds. The agency of insects in the transmission of diseases looms up ever more large, and the position of the mosquito as a nuisance and as a danger to health is firmly established.

In New Jersey the campaign against the mosquito has not been so much to check the spread and development of malaria as to render habitable those sections that the mosquito has, to a large extent, rendered uninhabitable, and the fight has been less against *Anopheles* than it has been against the species of *Culex:* primarily, those that breed on the salt marshes, and next against those that breed close to our houses and make life miserable indoors.

On the occasion of my previous lecture I told what was known about the general habits of mosquitoes, and illustrated the character of the work that was being done on the salt marshes. At that time the State was not committed to any systematic campaign. An appropriation had been made for the study of the problem, but beyond that matters had not gone. Since that time the State has taken action and has declared all mosquito-breeding places to be a nuisance, abateable as such by local boards of health. For this item of progress members of this association were largely responsible, and, indeed, members of this association have given me most efficient aid in my work against this pest. At that time mosquito work had been done on the Shrewsbury river, and a little of it had been done by Newark and Elizabeth. I was able to show pictures of the work carried on on the Shrewsbury marshes, and of that done by machine at Newark and at Elizabeth.

Great progress has been made since the State made its appropriation of three hundred and fifty thousand dollars in 1906. As a matter of fact, only $45,000 were actually made available up to the beginning of the present fiscal year, and with that amount we have cleared out all the salt marsh from Jersey City to the head of Barnegat bay. It

should be noted that the large cities, Jersey City, Newark and Elizabeth, have contributed nobly toward this work, and the two first-named cities have paid nearly, or quite all, of the bill for the work on the marshes within their jurisdiction.

At the present time the work is being carried on along the west shores of Barnegat bay, and before winter fully sets in I expect that Dover township, in which Lakewood is situated, will be completed, and that the work will be done to Toms River. Another stretch of the shore line that has been completed is the twelve-mile strip from Barnegat Junction south to the new inlet, on which Beach Haven is the principal settlement.

Progress has been made, not only in the territory covered, but in the manner of doing the work. The total acreage treated up to November 1st, 1908, is 17,620. The total number of feet of ditching is 2,394,174. Under contract at the present time, or done since the first of November, are over 2,000 acres in addition, with 300,000 feet of ditching.

In the progress of our work the first improvement that was made was in the manner of putting in ditches on the salt marshes. Instead of using the long-bladed spades that were found so useful on the Shrewsbury river, bog-saws were resorted to to cut the sides of the ditches, and long-handled spades and forks were used to take out the sods between them. This gave us deeper and cleaner ditches, and it was possible to get more of them in the course of a day. The next improvement was in the line of a huge spade invented by Edwin M. Skinner, of Staten Island, which cut the sides of the ditches and took out a full depth of sod at one time. This was a very effective, but a very heavy tool, requiring three men to manage it, and cutting from five to eight hundred feet a day with a trained gang. This kept the cost of the work down in spite of the increased cost of labor, and some very pretty and effective ditching was put in in Woodbridge township with this tool.

Another one of our contractors, Mr. Jesse P. Manahan, designed a lighter tool, all metal, which could be run by two men as rapidly and as effectively as the Skinner tool could be run by three men, and Mr. Manahan thus gained a little advantage over Mr. Skinner in the price of work. This Manahan spade proved extremely useful and very effective, and has been in continuous use since the time it was first introduced on the marshes at Secaucus. It is possible with this spade to dig a ten-inch ditch, thirty inches deep and take out a sod six inches in length, which can be laid at the side of the ditch in position and in perfect shape. Five to six hundred feet by two men is the capacity of this spade in straight-away work, and double-width ditches can be dug just as easily as those of single width, and that is a thing that could not be done with the Skinner spade. Hand tools, therefore, were very materially improved, and in this way the cost of making the ditches has been kept down in spite of the increased cost of labor.

In addition to that, the machines for ditching have also been im-

proved. The original True ditcher, as I found it in Massachusetts, was a very light affair, and the first machine that was put upon the marshes at Newark and afterward at Elizabeth was intended to dig a very narrow ditch and only two feet in depth. We found by practical experience that two feet was not quite deep enough. Six inches more improved the capacity of our ditches very materially, and gave them a drainage area much greater than those only two feet deep. Wherever possible, therefore, we make our ditches thirty inches deep, and we have found that in ordinary salt marsh such ditches will pull the water a distance of 100 feet on each side of them, so while we started with the idea that the ditches would probably have to be about sixty feet apart, we find now that it is possible to put them 200 feet apart, and to secure satisfactory effects where the ditches themselves are not over ten inches wide. There is some terrirtory, of course, where the ditches must be placed much more closely; but I am talking now of an average salt marsh. We have now six machines in use. All of them weigh, at least, three times as much as the first machines that were put on the meadows, and all of them capable of running 4,000 feet of ditching a day under favorable conditions. It requires a crew of five men to run a machine on ordinary salt marsh.

As to the effectiveness of the work, that is in some places most remarkable, and has produced a total change in the character of the meadow. Not only does the surface dry out and become solid enough so that mowing machines may be taken now where, three or four years ago, it was not even possible to walk without hip boots; but the character of the grasses has changed very materially. The sedges are disappearing and black grass is gradually coming in. Where the meadows have been drained longest the crops have increased enormously, and in some places four tons an acre of good salt hay is being harvested where, three or four years ago, nothing at all was taken off, or only a mixed lot of hay of inferior value. In addition to that the meadows are becoming more level. There is no rotting from standing water, and, under normal conditions, all the rain that falls on the meadow is taken up by the surface and appropriated without adding very much to the water in the ditches. On the other hand, the ditches being all connected with tide water, keep up a constant circulation in the meadow, so that the meadow never dries out completely. This produces the best possible condition for the growth of grasses, and the only objection to our work is that there are not ditches enough for the best interests of the meadow, even if there are sufficient to take off surface water.

A very interesting problem came up when we had the shore strip between Barnegat Junction and the new inlet to deal with. This whole strip is sand, and only on the western side, where it faces the bay, was there any true salt marsh. The sod on this marsh is shallow and lies on a bed of sand. Our ditches necessarily were shallow also, because there was no use in going below the sand layer upon which the sod rested. Nevertheless, the sod drained perfectly. We found, however,

that among the sand hills there were swampy areas in which these salt marsh mosquitoes breed abundantly, and it became necessary to deal with these. Some of them we could connect with the bay and live tide water. Others could not be so connected, because they were surrounded by sand hills. Some of these depressions were small and the problem was rather a simple one of filling. That filling, in order to obtain the best results, was made of a mixture of brush and sand. This made a very porous sort of filling: the water that fell upon the top soaked away very rapidly and completely. It also formed a good surface for vegetation to start upon, and we find that none of our fillings have become bad since they were made. In fact, they have improved and are in better condition now than when we left them. Other marsh areas among the sand hills were so extensive and the surrounding hills so low that filling was out of the question. We met the problem here in another way, by draining to the low point in the marsh area and digging at that place a permanent pond or pool, which could be stocked with fish. We met with some difficulty at first in getting a really permanent pool until we resorted to the device of sinking the largest barrels we could get hold of into the center of the pool. We found that by doing this we got below the permanent water line, and that there was actually an apparent rise and fall in our pools. They never dried out and we stocked these pools with the common killies that were found everywhere in the creeks and ditches. Some of these killies have lived for two full seasons and have actually multiplied in these pools, and the character of the swamp areas drained in this way has improved surprisingly. There has been no mosquito-breeding in these territories, and although our shallow ditches have grown up to some extent, nevertheless, it still forms a line through which the water finds its way to the low points, and at the low points there is a place for the water to get out. Very heavy storms bringing in great quantities of water may, at times, cover a portion of this territory and mosquito larvæ may make their appearance, but then the fish from the center pond come into action and very few of these larvæ ever get to maturity. We have watched these territories drained in this way for two full seasons, and they have proved entirely safe. They have stood one winter, with all its storms, and two summers. The territories are in as good condition now as they were when we left them, and I anticipate that they will remain so.

So our ditches, where they have not been interfered with, have stood the test—some of them of four years' work—and where the ditches are simply left alone they stand perfectly and continue to do their work. It is only when there is interference, either by the owners in harvesting crops, or by gunners, who find a wet meadow to their advantage, rather than a dry one, that there has been any trouble. It is quite possible that it may require legislation that will give the State Board of Health power to compel owners to keep these ditches in shape, or that may give the State Board authority to compel local boards to act in the premises.

Up to the present time matters have gone along very well, because I have kept rather close supervision, through my inspectors, over the work already done, and have personally urged local boards to action. I am making no reflection upon local boards when I say that they are very frequently slow to act when action means compelling some of their townsmen or neighbors to put matters into shape, or to expend either labor or money.

The peculiar climatic conditions of the season of 1908 has attracted a great deal of attention to the house mosquito. Over a considerable area the salt marsh mosquito was scarcely noticeable during the season of 1908, where, in previous years, it was the dominant species, but it was replaced by altogether unusual swarms of the common house mosquito, which found conditions remarkably to its liking, and a large portion of the breeding went on in sewer catch-basins in cities. This attracted attention to that feature of city work, and we find that the catch-basin system as at present organized is an open invitation to the house mosquito to develop in comfort and safety during seasons when there are no frequent rains to keep the basins flushed. City work, therefore, must be directed more and more to the catch-basin system, unless some device is perfected that will provide for the frequent flushing of these basins, or some method of drawing the water from the lower parts, so that an oil film on top of it would not be disturbed by water coming in. A basin of this type has actually been perfected, and a sample basin was put in at Newark, which we had an opportunity of observing in comparison with the normal basins. We found that this Hannagan catch-basin oiled once early in the season preserved a coating of oil until after mid-summer, in spite of the heavy rains of May, which poured floods of water into the top. This is another opening for the sanitary officers of cities, and it is a topic that might be taken up for discussion at one of the meetings of this association. That is, the preparation of or building mosquito-proof catch-basins in cities and towns.

THE SANITATION OF A CLEAN MIND AND A HAPPY DISPOSITION.

BY REV. HERBERT M. GESNER, ATLANTIC CITY, N. J.

It might seem, at first glance, that the particular subject assigned me for discussion has but little relation to the general topic which has engaged the attention of the members of this convention. The topic of Sanitary Science is essentially practical and material—dealing with such matters as light, air, heat, climate; with such practical concerns as drainage, sewage, ventilation; with such recognized principles as those of hygiene, and seeking such positive ends as the health and efficiency of man.

Now, the subject which I am to discuss, referring to none of these matters, but rather to their diametric opposites, since I am constrained by the limitation of my topic to speak of thoughts rather than of things, seems to have but little relation to the subject of sanitary science and its practical application in sanitation.

But this is to be deceived by appearance—those phantoms which daily deceive so many. Let us look a little deeper, let us ask what is the real object of material sanitation, and we discover that "sanitation is the devising and applying of means for preserving and promoting public health; the removal or neutralization of elements injurious to health, the practical application of sanitary science."

In other words, translating these little and detailed phrases into large language, we learn that the end of sanitary science is the well-being of man to be preserved and promoted by attention to his external environment.

Now, the subject upon which I am to speak is likewise the well-being of man, to be preserved and promoted by giving due attention to what we may term his internal environment. In other words, a man lives in the world of thought as much as he lives in a world of things, and what he thinks affects his well-being quite as much as what he eats and drinks.

Therefore when we consider the end of the discussions and devisings of these meetings—the well-being of man "in toto," we find that the topic assigned me has as rightful a claim for a hearing, on the floor of this convention, as any (yes, I shall put it as strongly as that), as any that has heretofore claimed your attention. I wish then to thank you for the honor you have done me, and for the courtesy which has been extended to me by your program committee in inviting me to speak on what is to me such a vital and interesting subject.

The interdependence and interrelation of body and mind is at least as old as the Latin maxim, which stated that the ideal and goal of

human existence was to be found in ***mens sana in sano corpore,*** "a sound mind in a sound body."

As a man lives in a material environment termed a world of things—which things have a very positive influence upon the thinker and his thinking—so a man lives in an immaterial environment termed a world of thought, which thought has a very positive influence and a very permanent effect on the body of the man and on that external material environment which he inhabits.

As a man cannot live foully and think cleanly, so a man cannot think foully and live cleanly.

To the second limb of this proposition we now turn our particular attention.

I. I believe it to be the true and the latest conclusion of science that the visible, the ponderable and the material world is the product and outcome of the invisible, the imponderable and the immaterial, and that all those things which occupy space and which have the characteristic accidents of matter are but the expression and manifestation of that all prevalent form of energy termed force. Did we have time, we might adduce large evidence and most weighty proofs to substantiate this statement, but we must take it for granted that you are abreast of the times in the domain of science and understand the truth that "those things which are seen were not made of those things which do appear."

In other words, the visible is the product of the invisible, the phenomenal of the nomenal.

Let me give just a simple illustration of my meaning. In an average human body weighing 140 pounds nearly 104 pounds is water—now water is a combination of two gases, oxygen and hydrogen—the rest of the body, let us say, is composed of albumen, fibrin, casein and gelatine, organic substances which themselves are resolvable into the four essential gases, oxygen, hydrogen, nitrogen and carbonic acid. "Thus our body is composed only of transformed gases." The vegetables, which we eat, are almost entirely drawn from the air—all vegetables may be resolvable into air, water, etc., or in other words into those very gases which we have already found in the body. And a meat diet is simply a diet of transformed vegetable matter.

Thus not to go more technically into the nature of the gas, which I presume on the last analysis will be found to be a form of force, we learn, to put it broadly, that the visible is composed of the invisible, the ponderable of the imponderable, the palpable of the impalpable.

The man materially considered, therefore, is merely a stream of sensations and ever changing ebb and flow of particles. The only stable, abiding, constant quantity within man, is that invisible unchanging *ego,* which no one has ever seen, yet which remains the same through infancy, childhood, manhood and old age, which organizes and co-ordinates particles and sensations, and to which we give the name of soul.

Thus do we learn, to quote the words of Camille Flammarion, from whom the substance of the above statements is taken, that "the visible universe is composed of invisible bodies. What we see is made up of things which are not seen," and "we find as the support of the universe and the origin of all form, force—the dynamic element."

Such a consideration as this positively changes our old way of looking at things. Reality is not that which is seen, but that which is not seen. That material world which seems so real and so abiding is, in fact, the unreal world. The world of the seen is the world of the unstable, the unreal, of appearance, phenomena. Whereas, the world of the unseen, is the world of reality, of substance, of that which is abiding and causative.

This view we reach along the road of science—not philosophy—in these days, and it is by no means a profitless work to turn our attention now and again in this direction, since it gives balance, counsel and proportion to all right thinking and living.

II. Turning from the macrocosm of the world to the microcosm of man we shall find a similar state of affairs. In man we shall discover that it is the invisible and immaterial which in large measure determines the visible and material. In other words, the utterance of the sage concerning man, "for as he thinketh in his heart so is he," is finding proof and increasing evidence in the science of psychology of this present day.

Let us present some of this evidence in briefest form:

(1) Thought affects things. It is possible for the physiologist to trace the vibrations produced by light or heat from that end-organ in the body which receives them up the nerve to the ganglia in which that nerve terminates, even from ganglia to the brain, and then the investigator reaches a gulf which he cannot cross. He stands on the borderland of a mystery; how vibration is transformed into sensation; how motion becomes notion, or notion, motion; how volition becomes action, no physiologist has ever been able to say. It is as inexplicable, declares Prof. Huxley, as is the disappearance of the Djin when Aladdin rubbed the magic lamp.

But while the process of sensation and of volition is but partially known, and therefore essentially a mystery, yet two facts are incontrovertible and provable beyond a doubt. As sensation proves the action of body on mind so does volition prove the action of mind on body. That thought affects things is evidenced every day of my life. The movement of my hand is the simplest, nearest evidence. I will to move my hand; I move it; my thought has affected that thing called a hand.

But let us look more widely. The clothes which we wear, the houses in which we dwell, the carpets on the floor, the furniture, pictures, bric-a-brac, books, are all evidences of the fact that thought affects things.

What is art but thought applied to the realm of form and color? So is sculpture and architecture. What is music but thought applied

to the world of sound? A great city with its streets, buildings, institutions, is only ideas manifested in material form—the incarnation of the invisible.

What do we mean by state, nation, civilization? Simply the co-operative and interrelated thoughts of many minds applied to and manifested in that great system of men and things called life. It is likewise true that these things once called into being affect the thinker and his thinking—they have a reflex influence.

Do you ask why the Germans are natural musicians? Because they have been reared in a musical environment. Why are the Japanese and Italians naturally artistic? Because they have lived in an artistic environment, and artistic things have led to artistic thoughts. Why are the Americans and English liberty-loving? Because, as we figuratively, yet accurately express it, they have breathed the very air of liberty. In other words, these and a thousand other like instances illustrate the fact that the mind is colored by what it feeds on.

But observe this: were there not thought in things (pictures, music, clothes, civilization) things could not affect thought, and again observe that all these varied material things of our artificial environment, which so powerfully affect and influence our thinking, lived first in the world of thought before they had an existence in the world of matter. In other words, they were *thoughts* before they were *things.*

In speaking of man's external environment it is well to remember that man lives not only in a natural environment—that which Nature freely gives to all her children—but he also lives in an acquired or artificial environment—that which Nature's children make for themselves, and the acquired environment influences and affects the well-being of man quite as much as does the natural environment. It is the natural environment which makes us merely animals; it is the artificial environment which makes us men. Moreover, the acquired environment is altogether and provably the product of mind as we have just briefly illustrated. Therefore, from your own viewpoint, that of man's external environment mental sanitation is a most important factor in material sanitation, and they must labor hand in hand for the promotion of the highest well-being of man.

In short, to quote from Aaron Martin Crane's book on Right and Wrong Thinking, "Man owes to mind all that there is in the external world except the earth and its natural products." To put it tersely, in our human experience and to confine ourselves to those things which we do know, thought comes first, chronologically as well as logically.

(2) But let us take a step further, and a very positive step—thought not only affects things but *thought makes things,* and our exemplification of this subject shall observe the limitation of our theme and confine its reference to the body of man.

Dr. W. Hanna Thomson, in a little book entitled "Brain and Personality," has evidenced from a purely physiological standpoint that the mind makes the brain. The old view, introduced by Hippocrates and

continued down to Karl Vogt, Cabanis and other writers in the earlier years of the nineteenth century, that the brain is a gland and secretes thought just as the liver secretes bile, has gone never to be revived.

Dr. Thomson from a study of the relation of speech to the brain, and of the growth, development, affection and destruction of the speech centers in the brain, has given good evidence that the brain is not to be likened to an Æolian harp played upon by unconscious and wandering winds, but is rather to be likened to the violin, which responds to the touch and interprets the soul of its intelligent and musical master. In other words, the brain is an instrument of the mind, which instrument the mind not only uses, but makes to use and makes through use.

Let me quote from Thomson's book (p. 30), "As none of these wonderful mental faculties, including that of speech, were connected with brain matter at birth but were created afterwards, it follows that they were created by the individual himself anatomically modifying his own brain. That brain matter itself did not organize these physical areas of mental function is shown by their entire absence from the convolutions of the wordless hemisphere."

Again he shows (p. 62–3) that thought efficiency is not proportionate to brain quantity, therefore it is not dependent of the size of the brain. Again (p. 76–77), "The brain of the chimpanzee, as far as structure goes, presents us not only with every lobe but with every convolution of the human brain. If the similarity of brain formation and mechanism, * * * be all that is needed, there would be no reason why baboons could not become philosophers or mathematicians." That is the chimpanzee has as good a violin as Paganini, but he is not as good a player.

Again, "Another important conclusion is led up to by these facts, namely, *that we can make our own brains*, so far as special mental functions or aptitudes are concerned, if only we have wills strong enough to take the trouble" (p. 217). Again, "We have definitely concluded that the facts of brain anatomy and of brain physiology indicate that this organ of the personality is never other than its instrument, while the personality itself is as different and as separate from it as the violinist is separate from and not the product of his violin" (p. 234).

We could not ask for clearer testimony than this. It is the testimony of Prof. James, of Harvard, that "All mental states (no matter what their character as regards utility may be) are followed by bodily activity of some sort * * * not only particular states of mind then (such as those called volitions, for example), but states of mind as such, all states of mind, even mere thoughts and feelings, are motor in their consequence (Psychology, ed. 1893, p. 5).

To this same end has spoken Ladd and Munsterberg, and President Hall, of Clark University, says still more positively "there can be no change of thought without a change of muscle." Prof. Elmer Gates, of Washington, deposes to the same effect: "Psycho-physical experiment proves that conscious experiences, such as those of sensations, intellections, emotions, &c. create structural changes and additions in brain

cells, which additions remain as the enregistered memories of those experiences." He further says, "The important conclusion is that the mind activity creates organic structures, and that mind embodies itself in the mechanism of the body."

(3) We conclude then from these general principles, induced from many instances, and backed by such high authorities, that the quality or the character of thinking affects the quality and character of our brain, brawn, health, conduct, life. That is, to state it in different form, the hygiene of the mind is of as great or greater importance than the hygiene of the body—which is another way of restating our theme that a clean mind and a happy disposition are a legitimate branch of sanitation in a broad sense. This we shall now proceed to specifically exemplify. Let us then affirm that unclean, impure, unwholesome thoughts affect the man's physical system—that aggregation of matter which he inhabits and which we call the body.

(a) Thinking manifests itself most readily in the face. Thoughts of grief affect the tear ducts and cause the man to weep; laughing thoughts, acting upon the appropriate muscles of lip, cheek and eye, make the laughing countenance. Still further—to quote from "Right and Wrong Thinking," p. 23-4, "The mental state of anger will make the heart beat more rapidly, send the blood rushing through the body with increased velocity, and flush or pale the face." Fear will cause a perspiration to break out over the body, "drive the blood from the face and cause such muscular tension or paralysis that severe illness follows and sometimes death." Fear is certainly a mental state affecting the physical man. In short certain mental states affect the respiration, circulation, the nervous system, and the entire physical man for ill. Nothing is more clear or familiar to your experience as doctors than that that mental state known as anxiety, worry, doubt, affects the entire physical man adversely.

I quote from a paper on "Worry," by Dr. C. Spencer Kenney, for twenty years connected with the Middletown, N. Y., State Homeopathic Hospital, in which he says: "There is no faculty of the human mind that worry does not affect. There is no organ of the human body that it may not destroy. * * * Pain is experienced about the head, irritability is marked, memory fails, the stomach seems to give up work, especially on certain articles of food, nutrition is impaired, depression of spirits as well as loss of physical strength becomes pronounced, the bowels grow inactive, and there is a drying up of all mucous surfaces, and sleeplessness sets in. With these symptoms alone the patient is well advanced toward acute melancholia."

These are facts of common knowledge; they have been familiar to you for years, but (b) the great advancement that has been made in these days has been in the discovery of the causes of these striking effects. Prof. Gates has shown "that the change of mental state changed the chemical character of the perspiration. When treated with the same chemical reagent the perspiration of an angry man showed one color, that of a man in grief another, and so on through the long

list of emotions, each mental state persistently exhibiting its own peculiar result every time the experiment was repeated," confirming Prof. James' statement, "that each kind of thinking, by causing changes in glandular or visceral activity, produced different chemical substances which were being thrown out of the system by the perspiration." (R. & W. T., p. 45.)

I quote again, "When the breath of Prof. Gates' subject was passed through a tube cooled with ice so as to condense its volatile constituents, a colorless liquid resulted. He kept the man breathing through the tube, but made him angry, and five minutes afterward a sediment appeared in the tube, indicating the presence there of a new substance which had been produced by the changed physical action caused by a change of the mental condition. Anger gave a brownish substance, sorrow gray, remorse pink, &c., showing, as in the experiments with the perspiration, that each kind of thinking had produced its own peculiar substance, which the system was trying to expel." (R. & W. Thinking, p. 45-6.) It is very apparent then that when the late lamented "Bill Nye" spoke of having a "dull maroon" taste in his mouth on the morning after the night before, that he voiced the effect of deep remorse in the language of fact rather than of figure.

I must quote still further to evidence the causative effect of these chemical precipitates. "The brownish precipitate from the breath of angry persons when administered to either men or animals caused stimulation and excitement of the nerves." The phrase "bad breath," therefore, I infer, may be used in a moral as well as an æsthetic sense. "Another substance produced by another kind of discordant thinking, when injected into the veins of a guinea-pig or hen, killed it outright." He concludes, "Every emotion of a false and disagreeable nature produces a poison in the blood and cell tissues." "My experiments show that irascible, malevolent and depressing emotions generate in the system injurious compounds, some of which are extremely poisonous; also that agreeable, happy emotions generate chemical compounds of nutritious value, which stimulate the cells to manufacture energy." (R. & W. Thinking, p. 72.)

Now, whether you are ready or not to accept the results of these experiments is not important; one thing is clear and incontrovertible, namely, that our attention is very definitely directed to the undeniable fact that an unwholseome mental state causes unhealthful bodily conditions, and that many a physician would prescribe more wisely and well for his patient by directing the patient's mind than by dosing his body I have little doubt.

As it is true that unclean and unhappy thoughts effect the bodily health adversely, so it is likewise true that clean, wholesome and happy thoughts affect the entire man helpfully and healthfully. Dr. Anderson says, "Experiments comparing agreeable exercises with those that are not so agreeable showed that movements in which men took pleasure set in motion a richer supply of blood than those which were not to their liking. * * * Pleasurable thoughts send blood to

the brain; disagreeable ones drive it away." (R. & W. Thinking, p. 42.) And President Hall has written, "The hair and beard grow slower, it has been proved by experiment, when a business man has been subjected to several months of anxiety. To be happy is essential. To be alive and well and contented is the end of life, the highest science and the purest religion." I do not believe any one here present will be inclined to disagree with this conclusion.

Perhaps, then, we have said enough to evidence the fact that if a man's thoughts are sweet and wholesome, and if his mental tendency and inclination—in other words, his *disposition*—is hopeful and happy, it will be better for him bodily, socially, economically and politically; in every way better for himself, and, therefore, better for his environment, which includes those many other persons with whom he comes into contact and relations for help or for harm. Indeed, one of the best services man can render to his fellow-man is to have a pure mind and a sunny disposition and to unconsciously radiate light wherever he goes.

That a clean mind and a happy disposition may appear to you as a practical possibility rather than as an ideal speculation it will be necessary for me to call your attention to a further proposition which I believe to be capable of substantiation, to wit

III. The Mind has the Power of determining itself.

(1.) This, indeed, is the essential characteristic of mind. I am not going to lead you along the path of the afferent and the efferent nerve to the various ganglia in the spine; I am not going to dwell upon the function of reflex action, sometimes thought of as unconscious action, which it never is, nor am I going to call your attention to the limitation of reflex action in the well-recognized law of inhibition; I am not even going to sing the old song of Habit, its uses and abuses, though that song will never grow old nor cease to make its music or its misery in life as long as nerve stuff is capable of education through stimulation and as long as man is man; nay, I shall eschew all these fascinating by-paths and simply affirm what is the fact—that the mind has the power resident in itself of determining its own mental states.
Suggestion, condition, incentive, impulse may come from without, but the "mind is supreme even over itself, in that it determines its own activities." This is the divinity within a man; this constitutes his personality.

Says Thomson anent this subject, "Personality with a purpose can specialize anything nervous." "A great personality can make a great brain, but no brain can make a great personality." Again, to quote Thomson, "As already demonstrated, one of the properties of the personal human will is that of being a specific brain stimulus, more potent than all afferent stimuli together in producing changes in brain matter, by which the brain acquires, and by it alone, entirely new powers or functions not possible in any other animal brain." * * * "Therefore, gain the ear of the will first and everything naturally, because physiologically, follows." In other words, we have an analogy here between outer and inner, general and individual sanitation.

When you can bring it to pass that the Legislature, local or general, enacts laws (and a law is but an expression of will) regarding clean back-yards, pure drugs, pure food, &c., the end of the New Jersey Sanitary Association is in a measure accomplished; but after the enactment of the law must come the application and untiring enforcement of the law. As the campaign previous to the passing of the law must in large measure be a campaign of theoretical education, so after the law is on the statute books there must be a combined effort for practical education, until the people at large get the sanitary habit.

Likewise when those of the inner branch of Sanitary Science can bring it to pass that the legislature resident in every man shall enact laws (or exercise his will) regarding clean thoughts, happy disposition, the value of mental pure air and of thought sunshine, much will have been done in the direction of better living.

Yet after the initial exercise of the will comes the practical education, the untiring watchfulness, the patient effort, until men learn the habit of a Happy Mind, and, as Robert Louis Stevenson says, "The world is so full of a number of things that I am sure we should all be as happy as kings."

(2.) There is another side to the affirmation that the mind has the power of determining itself, it is the peril which always accompanies the possession of power. It is possible for the mind to prove traitor to itself, to sell its birth-right, and, as Shakespeare says, "Can make the worse appear the better reason." Prove false to the light that you have and your light becomes darkness. In other words, an evil will can compel the mind to give good reasons for a bad cause.

"A prominent body of professional men among us live by letting out the entire equipment of their mental faculties for hire. After a lawyer has accepted a retainer he commands his mind forthwith to busy itself with all its resources of reasoning and of persuasion for the party who pays him. Even his emotions, from the extremes of pathos to those of indignation, may be pressed into the service as well. But no man can let out his will for hire, and he lies when he pretends to." (Thomson ibid., p. 253.)

Therefore, an eye open to the light and a will responsive to the self-evident truth is the only simple, safe prescription for the making of a brain that will deal with you honestly. "To thine own self be true, and it must follow as the night the day thou canst not then prove false to any man."

(3.) But this function of mind or will, the power of determining itself, has a particular application to a particular phase of our particular theme, namely, the making of a happy disposition, and in this respect ourselves become our patients, and we have great need of taking our own prescription.

I do not believe that many will be inclined to deny that a happy, bright, cheerful disposition is on every side (private, public, mental, moral, material) more to be desired than an unhappy, cheerless, disagreeable disposition. But I am firmly convinced that very many will

confute the idea that we can make our disposition happy and agreeable; and yet there is no more reason for denying my last statement than there is for denying the one that just preceded it, save that the truth of the one lies upon the surface and of the other the reason lies a little deeper. Therefore, we shall boldly assert not only that we can make our dispositions, but that we do make them, and that we ought to make them happy.

For the man with the unhappy and disagreeable disposition to say, "I was born as I am, and I am not responsible," is to surrender the goodly country without a blow; is to play traitor and throw open the gates of the mind to the entrance of every hostile influence; it is to yield the case before it has been even begun. To seek to shift the responsibility and to lay the blame on other than self, to say, "Don't blame me, blame grandfather or Oliver Cromwell for my disagreeable disposition," is to follow a very common, a very natural and a very fatal tendency. You may remember that Adam blamed Eve for the trouble, and Eve blamed the old serpent, and I have little doubt that that most subtle creature did not allow the blame to remain on his head, and so it has gone from that day to this.

If we do not blame our ancestors for what we are, we blame our contemporaries, or our environment, or anything other than self. The absurdity of this is plain for the reason that the environment will never make the man; it only helps the man to make himself. In saying this we do not minimize the importance of the environment, but we do magnify the importance of the mind, and the mind in its largest sense, is the man. It is the man who makes the environment.

The validity of the above statement is evidenced beyond contravention by thousands of noble men who have risen above their environment. The utter fallacy of the excusing argument is further plain from a consideration of the kingly power of the human will. No *one* and no *thing* can compel my will, but myself.

To this effect has J. Clark Murray written in his Handbook of Psychology (p. 430): "This freedom of the self from determination by the world of objects is the fact which alone explains, without explaining away the consciousness, that there is within us a center of conscious activity which is, in the last resort, impregnable by any assaults of mere force. You may apply to my organism superior forces of organic or inorganic bodies, and compel *it* to act as you wish. You may employ all the sensible inducements at your disposal in order to bend me to your purpose; you may tempt me with the most bewitching sights of sense, or scare me with its most frightful agonies. You may even, by ingenuity of torture, so shatter my nervous system as to prevent me from carrying out into the world of sense the deliberate resolutions of myself. But there is one thing which mere force—force separated from reason—cannot do; it cannot compel *me*."

Nay, I say it reverently, even God himself refuses to compel man's will, and his power over us is limited by that amount of will-power which he has delegated to us. This power of will within us is our resident Divinity, and we are like Him in that we are free agents.

If one should ask how our unhappy and unwholesome dispositions have grown to be what they are the process can be stated in almost syllogistic form:

We have begun with the false major premise, "I am not to blame for my disposition." We have continued with the false minor practice of crabbed, critical, unsympathetic, unhappy thoughts and acts with respect to this and that person, this and that situation, until we have reached the miserable conclusion, and, like Sinbad, the sailor, continue our burdensome, baneful way through life with the old man of the sea of an unhappy disposition clinging to our backs.

When we might have been like noble and bright-faced Prospero, we have allowed ourselves to become a misshapen and distorted Calaban, distressed with inward cramps, and we live railing at our untoward environment, and blaming everything and everybody, save ourselves, for our wretched and uphappy lot.

Some one will ask how is this unhappy disposition to be changed? I answer in like manner as it was created: by degrees, by persistence, by patiently unravelling the mental tangle, by gradually displacing the sad and anæmic cells of the brain with healthier, wholesomer substitutes; by recognizing the power of happy thinking; by exercising that eternal vigilance which is the price of personal, as well as of political, liberty.

The very fashion of our features and the attitude of our bodies can help us in this worthy work. It is possible to get out of bed in the morning with a pleasant expression on your face, and to sing while dressing, if you only will do it. Force a smiling face and the smiling face will come spontaneous after awhile. The Japanese have consciously trained themselves in the art of smiling. "Cultivated from childhood as a duty, the smile soon becomes instinctive."

One of your own doctors told me of a woman who had cured herself of melancholia by going apart into a room by herself and exercising her risibilities until the outward action produced the inward state. A smiling face may induce a smiling mind. To this effect has William James written in his talks to teachers: "Thus, the sovereign voluntary path of cheerfulness, if our spontaneous cheerfulness be lost, is to sit up cheerfully, to look around cheerfully and to act and speak as if cheerfulness were already there." In short, if you haven't a happy disposition get busy and make one.

IV. And lastly we ask, what is the final cause or trend and promise of all this sanitation, mental and material?

I believe it to be obvious that a perfect environment is futile for an imperfect man. If the man will not correspond with the environment, the environment will not make him. It is possible to be the son of a professor, in a college town, and to grow up an ignoramus, or to live in the sunshine of Southern California and to dwell in a cave.

Jacob Riis has shown us that sanitary tenement houses may be used in a most unsanitary way by people who are not willing to live up to the improvements. Moreover, a perfect man is helpless in an imperfect

environment; the environment will kill him, as corrupt Judaism killed the Christ, or as fever-ladened air will kill the strongest man. But when we have reached the point that we have a perfect man in a perfect environment—a clean and happy mind in a clean and wholesome world, then the old ideal of the Roman philosopher is attained—"*mens sana in sano corpore.*" Then the terms of the definition of life, of the modern scientist, is satisfied, and we have the conditions of Life Eternal.

The testimony of science is to the effect that the environment is improving year by year, age by age; this is the promising principle of material evolution.

The testimony of the psychologist is to the effect that the mind is advancing and improving year by year and age by age—this is the promising principle of spiritual evolution.

The witness of the prophet confirms the witness of science and the witness of psychology, and we confidently look forward to the day when there shall be no more sighing, nor crying, nor sorrow, nor sickness, nor dying, when there shall be no more sadness, nor badness, nor madness—for the former things shall have passed away and man shall enter into life which is endless because perfect.

POLLUTION OF THE DELAWARE RIVER; ITS CAUSE AND REMEDY.

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The Delaware river is interesting to sanitarians from three standpoints. First, it is closely associated with the land of three States—New York, New Jersey and Pennsylvania. Second, it is used as a source of public water supply by many towns in Pennsylvania and New Jersey; and third, it has been looked upon for many years as a natural outlet for sewage and other refuse by towns which are located on its banks or on tributaries of the main stream.

As regards the pollution of the Delaware river, much can be said. From the source of the river at Stamford, in New York, to its final end at the capes, a distance of 410 miles, there are various points at which gross pollution is always in evidence, many places where slight pollution occurs, and a few scattered camping spots where pollution exists only during the summer months. The main sources of pollution in the river come from towns and cities on the stream proper,

or its tributaries, which discharge untreated sewage into the waters. The three States are alike responsible for these conditions—the large cities being Port Jervis in New York; Allentown, Easton and Philadelphia, in Pennsylvania; Phillipsburg, Trenton and Camden, in New Jersey.

Besides these there are 11 towns of an average population of 400 in New York; 50 in Pennsylvania, with an average population of 7,000; 32 in New Jersey, with a population ranging from 13,000 down, which allow raw sewage to flow into the river. In addition to the above there are 25 rivers and creeks draining into the Delaware from New Jersey; 10 streams, including the Lehigh from Pennsylvania, and 6 in New York, on which more or less pollution, either direct or indirect, exists.

The total drainage area of the Delaware in New York is 2,650 square miles, with approximately 16,000 people, or 20 per cent. of the population of the entire watershed, contributing to the pollution of the Delaware river through public and private sewers. Of this number only two towns purify their sewage—Stamford by chemical treatment, and Liberty by sedimentation, contact beds and aeration.

In addition to domestic sewage there are 23 acid factories, 74 creameries and 2 tanneries which discharge their waste products into the stream or tributaries within the State of New York. There are no water supplies taken from the river by the States of Pennsylvania or New Jersey within a distance of 50 miles from the point where it leaves New York State. The first municipality taking such supply being Belvidere, in New Jersey, situated about 53 miles below the New York State line.

The total drainage area of the Delaware river in Pennsylvania is 6,574 square miles, or 15.4 per cent. of the total area of the State. The total population in the watershed is 2,455,900, or 35 per cent. of the entire population. Only four places in the basin have sewage purification works of any size. There are several minor plants in the basin which are owned by private corporations or individuals. The great bulk of the sewage goes untreated into the waters of the State. In addition to domestic sewage there enters into the stream or its tributaries mine drainage and tannery wastes which are exempted by the laws of Pennsylvania.

The total drainage area of the Delaware river in New Jersey is 2,345 square miles, or 44 per cent. of the entire area of the State. The population in the basin is 466,000, or 20 per cent. of the entire population of the State.

The river is receiving directly or through tributaries sewage or sewage effluent from 48 municipalities, large and small. Twelve have established sewage disposal plants. The remaining towns having sewer systems have been notified to prepare plans for disposal plants or, in several instances, to remove the cause of pollution if it be of a private nature. In addition to the regular sewage there are various points at which trade wastes enter. Such factories as produce these

have been ordered to cease pollution or provide means for purifying the waste. Creamery wastes also form a source of pollution which is disagreeable in the extreme and not easily taken care of.

Outside of the regular pollutions by means of sewerage systems there exists in all the States various sources of minor pollution such as private drains, privy vaults, garbage and rubbish dumps, which either exist directly on the stream or are situated in such a manner that their wastes will be deposited in the stream. Inspection in New Jersey has revealed many of these, both on the main river as well as its tributaries. A number approximating those found within the year in New Jersey would run up close to the four-figure column. These pollutions exist because of the fact that the individuals look upon the stream as a natural carrier and purifier of such waste and, in their eagerness to rid themselves of the material at the least possible cost, think nothing of the people who may use the water as a source of public supply below, but cast into the stream with no hesitation any kind of refuse from a tin can to a dead horse.

It is interesting to note that, including Philadelphia and Camden, there is discharged into the Delaware river and its tributaries at and above this point approximately 188,721,000 gallons of raw sewage per day, and as the discharge of the river during the dry period is only about 1,283,000,000 gallons, it can be truly said that this water constitutes both meat and drink.

An incident of garbage pollution may well be cited where at Easton the city allowed the scavenger to load the collected material upon a scow, carry it to the junction of the Lehigh and Delaware and there dump it overboard. Thanks to the prompt action of Doctor Dixon, Health Commissioner of Pennsylvania, this practice has recently been stopped.

Another feature which cannot be overlooked is the pollution caused by railroad trains when crossing bridges over the river or its tributaries. Toilets being left unlocked when crossing such places offer a broad field for the transmission of various diseases, as may be recalled by the well-known outbreak of typhoid in Scranton traced to pollution of a reservoir by material coming from the trains crossing in several places the stream feeding it.

Although this feature of pollution may seem to be stretching a point, still every factor which has or may have a tendency to pollute any stream used as a source of public water supply should not be overlooked. The very fact that pollution may occur should be sufficient to generate extreme watchfulness on the part of those in authority and cause them to take preventive measures in many cases rather than be obliged to take remedial ones at a later date.

REMEDY.

In this age of extreme activity and careful thought, it would seem to the uninformed a small problem under existing law to remedy the pollutions already pointed out. This is, unfortunately, not the case.

In the work of purification of streams, the persons being charged by law with its operation are met with direct opposition in the majority of cases instead of the co-operation which should come willingly. Coercion is a disagreeable feature of the work but must be used where other means fail, if the desired results are to be obtained. The movement is decidedly one of education, and if the scholar refuses to receive knowledge and enlightenment of his own free will, it must be forced upon him. Towns and cities really requiring disposal plants can scarcely be made to see the value derived by building suitable systems for the disposal and purification of sewage, and appear willing, oftentimes, to expend large amounts in litigation rather than be forced into doing that which will result in great good to themselves and cause pleasant feelings for them to exist among their neighbors lower down the stream.

The States of Pennsylvania and New Jersey are actively engaged in causing purification of the sewage flowing into the river from their respective territories. The law of New Jersey provides for the submission of plans for disposal plants to the State Board of Health, and already the various towns polluting the river are under orders to submit such plans and have the disposal plants in operation by a certain time, varying from the present until 1913. Phillipsburg is at present in the Court of Chancery for refusing to comply with the orders issued. Millville is at work on a disposal plant. Merchantville has completed one.

Roebling is preparing one. It is the intention of the Board to compel action in regard to sewage purification in all towns now having sewer systems, and since any towns desiring to install sewers must first submit plans to the Board of Health, it is safe to say that proper purification will be demanded. Inspection of the river and its tributaries has progressed rapidly during the present year. Many minor pollutions, as already referred to, have been discovered and the offenders ordered to make other disposition of their polluting material. In this work, also, much opposition is encountered, various individuals believing the notices served to be a mere farce and the removal of their source of pollution being simply ordered through spite. This will in time be overcome, and those in authority must expect such a view of the matter to be taken until more knowledge is gained by the offenders.

Pennsylvania is working along the same line as New Jersey, hampered perhaps a little by insufficient legislation but nevertheless making good progress in the work. Sewage purification plants have been ordered in many of the towns, some are completed, others in progress of construction, and it is probable that before long all the towns and cities in Pennsylvania contributing to the pollution of the Delaware will be under orders to purify their wastes. New York will doubtless follow the steps of New Jersey and Pennsylvania in this respect, although not an offender to such an extent as the sister territories.

But when the ideal state of affairs is reached and all towns have purification plants, does the work cease? Decidedly not. Strict supervision of the plants in operation must be maintained. Legislation should

give to the State Boards absolute control of the workings of the plants, with power to cause such changes to be made from time to time as appear to be necessary. It is only in this way that the work can be made a success in every particular, since laxity in operation of purification works causes results as bad, if not worse, than when there is no purification at all.

Then, too, there is another feature. In order to insure complete safety to the people it will be necessary to filter the water supplies taken from the river. Such action will remove those municipalities using the water from the class designated by the distinguished German sanitarian who was visiting this country for the purpose of studying the sanitary work of the Massachusetts State Board of Health. He said, "It is all very fine, but funny; you purify your sewage, but drink your water raw."

I wish to thank Mr. A. G. Fowler, Assistant Chief of the Division of Sewerage and Water Supplies of the State Board of Health, for the assistance rendered in the preparation of this paper. Also the Department of Health of Pennsylvania and the Department of Health of New York for much information regarding their respective states.

(For discussion of Mr. Herbert's paper, see pp. 10–15.)

MODERN TREATMENT OF SEWAGE.

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The subject on which I have been requested to speak to you is so broad that within the limited time available to me only a few features can be presented adequately. The word "treatment" in this connection is usually regarded as synonymous with *"purification,"* and there are many ways in which this end is sought to be accomplished. Complete purification of sewage is practically impossible by artificial methods that are not financially prohibitive, and experience has shown that Nature's methods are not always satisfactory within reasonable periods of time. It is therefore necessary to be content with a *partial* purification of our polluted waters, and the variation in the *degree* to which impurities are eliminated, forms the basis of the numerous processes that have been devised for the treatment of town sewage.

In general, the conclusion was reached about twenty years ago that sewage could be properly purified only by filtration or slow percolation through land. During recent years, however, other methods have been evolved which indicate that a satisfactory effluent may be produced at relatively moderate cost in localities where the requisite area of land for filtration or irrigation is not available from a financial point of view. These new methods of purification are essentially

biological in character, depending upon the activity of various micro-organisms, of whose nature or life-history comparatively little is yet known. The function of these organisms is apparently to dissociate or reduce complex organic matter into simpler substances, partly soluble, partly insoluble, and partly gaseous, and the aim of these methods is to provide the best practicable facilities for promoting the development and activity of such micro-organisms in the shortest space of time without the creation of nuisance.

Inasmuch as so little is known of the exact nature of these micro-organisms, progress in the development of biological methods of sewage treatment has been essentially empirical, thus giving rise to numerous variations in method and results achieved. In one season of the year more satisfactory results are obtained than in another season, and the same process produces different results in different localities in the same season, or at the same temperature. The process, therefore, seems to be dependent on the composition or constitution of the sewage. Possibly some of these differnces are attributable to differences in the methods of chemical and physical analysis and observation adopted in various places, but it is entirely reasonable to suppose that the action of the micro-organisms is either favored or hindered by the presence of chemical compounds derived from the waste liquids of various domestic and industrial processes.

Comparatively few studies of the effect of different quantities of such chemicals, when mixed with ordinary domestic sewage, have been made with respect to the action of the micro-organisms, and hence it is very probable that the installation in a town of some new industry, which produces a relatively large quantity of waste liquid detrimental to such action, will result either in a change in the method of sewage treatment or in the rigid exclusion of such liquid from the public sewers. Both of these contingencies are often very serious, and interfere with the growth and prosperity of the community. It therefore follows that the best method of treating the sewage of a given city can be determined only by careful experiment, and that the continuance of such method depends on the nature of the industries that may locate in the city in the future.

In general terms, sewage may be said to consist of a mixture of clean water with various soluble mineral salts and a variety of nitrogenous and carbonaceous organic matter, partly in solution and partly in suspension, and also more or less putrescent and putrescible in character, together with a certain quantity of insoluble mineral matter. This mixture is usually an opaque, grayish liquid, having considerable coarse organic matter floating on the surface, but carrying more in suspension below the surface when in rapid motion, the heavier insoluble organic and mineral matter then rolling along the bottom of the sewer. The liquid also teems with micro-organisms of various kinds, and has generally an offensive odor.

In the treatment of sewage, the aim is to remove all of the suspended and insoluble heavy matter, and to convert the dissolved putre-

scent organic matter into compounds which will be comparatively non-putrescible, thus producing a clear and odorless liquid effluent, which shall also contain a smaller number of bacteria than originally. The methods of accomplishing this end were first left in the hands of engineers, but soon chemists were called into council, and for many years a vast amount of study and money was expended in endeavors to attain satisfactory results by purely chemical means. Most of these processes, however, proved to be too expensive when carried out properly, and hence when it was demonstrated about twenty-four years ago that the oxidation of organic matter was chiefly a biological process, due to the action of micro-organisms, the attention of experimentors in sewage purification was quickly directed to this new field. A great advance has been made by these new methods, but as they are usually very expensive, much still remains to be accomplished before an economical solution of the problem is reached.

It has been found that in all schemes of sewage treatment much trouble is caused by the suspended solid matter, and the tendency is now to make progress by removing these solids from the liquid as quickly and thoroughly as possible by mechanical means before applying the biological process. This has again placed the subject in the hands of engineers, and has resulted in the invention of a number of ingenious devices for extracting the coarse matters, as well as in the development of the physical principles governing the sedimentation of the finer matter, thus leaving chemists and biologists to deal only with a turbid, ill-smelling and bacteria-laden liquid, which contains mainly the dissolved organic matter.

It has also been found that this dissolved organic matter is usually capable of rapid oxidation, while the finely-divided matter which makes the liquid turbid, is composed mostly of stable or slowly putrescible organic matter, whose presence in a stream will not cause offensive odors and deposits. The modern process of purifying sewage may, therefore, be said to consist essentially of two distinct stages, the first being the removal of the suspended matter, while the second is the oxidation of the putrescible organic matter in solution. A consideration of both of these stages is here impracticable for lack of time, and as much has been written about the second stage during the past few years, it will be my purpose to bring to your notice some of the details of the first stage, especially as this part of the subject has been studied very carefully in recent years by the sanitary authorities of Germany.

In general, it may be said that the suspended matter imparts to town sewage its offensive appearance, and causes primarily the serious complaints about the pollution of natural water courses. It also seems to be comparatively simple and inexpensive to remove this matter before allowing the sewage to discharge into a stream, and when such steps are not taken promptly it is resented by the public. If the region is densely populated it may be conceded that it is impracticable to maintain the river in such a condition of purity as to render its water

fit for drinking, but it can reasonably be demanded that the stream shall have a sightly appearance and be pure enough to allow hardy food fishes to live therein.

The establishment of these two conditions, however, is by no means accomplished simply and inexpensively, but has taxed engineering skill to the utmost. It depends mainly on the size, minimum flow and characteristics of the stream into which the sewage is discharged. If the river is habitually turbid fish will be absent naturally, and if its least daily flow is also more than forty or fifty times the volume of sewage it will not be very difficult to preserve its appearance by removing the coarse suspended matters from the sewage by simple screening. This combination, however, occurs rarely, as in the majority of cases the streams are sufficiently clear to sustain fish-life except during freshets, and the dry-season flow is often only a few times greater than the quantity of sewage, so that the dissolved organic matter cannot become oxidized quickly enough to avoid the development of disagreeable odors and injury to fish.

The important feature for the inoffensive discharge of screened sewage into a river seems to be the greatest possible aeration of the water; or in other words, the water must contain a large amount of air or oxygen in solution. This is attained when the water moves rapidly and turbulently so as to expose all parts to the atmosphere. Dibdin states in his treatise on the "Purification of Sewage and Water" (p. 357), that the maximum quantity of oxygen that fresh river water will absorb in summer is 8.786 parts by weight in 1,000,000 parts of water, which is equivalent to 73.4 pounds per 1,000,000 U. S. gallons or 133,681 cubic feet; also that the river water will not become offensive by the admixture of sewage if the quantity of organic matter therein requires for its complete oxidation less than one-half of this quantity of oxygen. He further states that crude sewage requires about 60 parts by weight of oxygen in 1,000,000 parts of sewage for the complete oxidation of the organic matter, which is equivalent to 501.3 pounds of oxygen per 1,000,000 U. S. gallons of crude sewage, while sedimented sewage requires only 58 per cent. or 292.4 pounds.

From these figures it will be found that the least permissible dilution of crude sewage with fully aerated river water is about 16-fold, and for sedimented sewage about 10-fold, in order to prevent the development of offensive odors from the river. Practically, however, these figures must be increased considerably, as in consequence of sluggish flow, the river water rarely contains the maximum quantity of oxygen in solution, and must also give up a portion of this oxygen to the organic matter in the water before being mixed with the sewage. Furthermore, the said minimum rates of dilution do not take into account the requirements for the maintenance of fish, nor the deleterious substances derived from certain industrial wastes that may be discharged into the sewers.

The quantity of organic and suspended matter in sewage varies widely in different places, and also at different seasons, days and hours in the

same place. An extensive study of this subject was made by Geo. W. Fuller in his paper in *Technology Quarterly*, for June, 1903, from which it appears that in three small American cities the average flow of sewage is 95 U. S. gallons, and the average quantity of organic matter is 65 grams per head daily, of which 41.5 per cent. is dissolved, and 58.5 per cent. suspended; while in one large American and four large English manufacturing cities the averages are 90 U. S. gallons and 166 grams per head daily, of which 45.8 per cent. is dissolved and 54.2 per cent. suspended. Reducing to parts per million by weight, these figures for the total organic matter become respectively 181 and 487; and in the latter case the suspended organic matter is 264 parts per million, or 2,206 pounds per 1,000,000 U. S. gallons. The newest data compiled by German authorities show the average quantity of suspended matter, mineral and organic, in the sewage of 13 larger German cities, as ranging from 1300 parts per million in Frankfurt to 270 in Hanover, with an average of 581, while Paris heads the list with 1,515 parts per million, corresponding to 12,658 pounds per million gallons. The proportion of organic substance in the suspended matter is given for only a few of these cities, the figures ranging from 40 to 71 per cent.

In considering the efficiency of any particular apparatus for removing the suspended matter, however, the use of general averages may lead to erroneous conclusions, as the apparatus may be specially adapted for intercepting the greater part of the putrescent matter, although allowing finely-divided and light non-putrescible organic material to escape. It therefore follows that much depends on the nature of the suspended organic matter, as well as on its relative quantity at different times. The variation in quantity and quality during twenty-four hours is well exhibited in the recent report (1906) of Messrs. Hazen & Whipple on the sewerage of Paterson, N. J., which shows that at a number of different points in that city the quantity of total solids in the sewage varied from 363 to 2,755 parts per million, of which the organic substances ranged from 150 1,866 parts, while the suspended matter ranged from 45 to 641 parts, or from 376 to 5,356 pounds per million gallons. Numerous other analyses might also be cited, but the foregoing figures will suffice to indicate the variation that may be expected in the composition of municipal sewage in the course of a single day, and the relatively large proportion of suspended matter, mostly of organic nature, that comes during certain hours.

The efforts to remove the suspended matter from the sewage are usually made in three directions: 1. The quick sedimentation of the heavy mineral matter in suitable small tanks or enlargements of the cross-section of the main sewer. 2. The screening of the liquid through gratings and sieves having apertures ranging from 2 inches to 1/25 inch in width. 3. The slow sedimentation of the lighter suspended matter in large tanks. All of these processes are essentially mechanical in character, and each removes a certain percentage of the total quantity of suspended matter, depending on the design and method of operation. The dissolved matter remains in the effluent, and is either discharged

into the outfall or subjected to further treatment according to local conditions.

No settled practice with respect to the design of either of these three processes seems to prevail. The receptacles for intercepting sand, gravel, stones and other heavy material that usually moves along on the bottom of the outlet sewer, vary greatly in size and shape for the same daily discharge. In general their function is to reduce the velocity of the sewage sufficiently to allow the heavy matter to settle on the depressed bottom, whence it is removed at frequent intervals, either by suitable dredging appliances or by hand, and dumped in some convenient place. Most of this material is of mineral character, and drops to the bottom within one minute. In some cases, however, it becomes desirable to extract very fine sand or grit, which requires from five to ten minutes to subside, and the tank or chamber is then made much larger and wider. Thus, the grit chambers at the heads of the large inverted sewer siphons under the Seine at Paris are from 100 to 600 feet long, and the velocity of the normal flow therein is from six to eight inches per second. In some other cities, however, the cross-section of the chamber is enlarged so as to reduce the current to two or three inches per second, and the length of the chamber is from 30 to 60 feet.

It may be noted in this connection that quartz sand, whose grains have an average diameter of 1/50-inch, will sink through still water at the rate of about 12.5 feet per minute; grains of 1/100-inch diameter, at the rate of 6.5 feet; grains of 1/200-inch diameter, at the rate of 3.0 feet; and grains of 1/250-inch diameter at the rate of 1.6 feet, on the average, the velocity in all cases depending on the shape of the grain. As the depth of the grit chamber of a large sewer is usually not less than 10 feet, it follows that in order to secure the settlement of grains of sand 1/250-inch in diameter the length of the chamber and the velocity of the current therein must correspond to a time of at least 10 minutes; so that if the mean velocity in such a tank is 2 inches per second, the length of the tank must be at least 100 feet. If the tank is shorter, it is obvious that with the same velocity as before it will intercept correspondingly coarser sand only. In some designs the chambers are made relatively deep and short, but this cannot be as effective as a moderate depth and greater length unless the direction of the current is changed by partitions.

With respect to the quantity of grit collected in such tanks comparatively few data are available. At Manchester, England, the deposit, along with the screenings, in dry weather is about 934 pounds, or 8.0 cubic feet per million U. S. gallons of sewage, but during rain-storms the rate is increased about 50 per cent. The material from the grit-pits consists of sand, coal-dust, cinders, gravel, small stones, pieces of brick, leaves, etc., about one-third of it being combustible. At Boston, Mass., the detritus removed from the settling chamber of the Dorchester sewage pumping station during 1903 was at the average rate of 900 pounds, or 8.37 cubic feet per million gallons. At the experiment

station of the Mass. Institute of Technology, Boston, where the sewage is drawn by a pump from a level considerably above the bottom of the main sewer, and is thus free from the heavy mineral matter rolling along the invert, the quantity of detritus collected in 1906 was at the rate of 1,600 pounds, or 16.5 cubic feet per million gallons. This material contained about 27 per cent. moisture, 12 per cent. dry sand and 61 per cent. fine dry matter, of which only 1/9 was combustible; it is described as being mostly clean sand, mixed with a considerable quantity of coal cinders and small bits of wood, cloth, etc., and that no offense was noticed by its deposit on the surface of the ground.

During 1897 about 741,300 cubic feet of sand was removed from the various grit chambers in the main sewers of Paris, and in addition thereto from 420,000 to 530,000 cubic feet of heavy deposits per year are said to be removed from the smaller mains. In the year mentioned the normal volume of sewage from the entire city was estimated as about 141,500,000 U. S. gallons daily; hence, if the annual quantity of grit removed is assumed at 1,216,300 cubic feet, the rate will become 23.5 cubic feet per million U. S. gallons. Doubtless this rate will become smaller if the storm-water is taken into account. Similarly, the total quantity of sewage and storm-water pumped during the year 1900 at two stations of the sewerage system of Berlin (Radical Systems V and VII, which serve an aggregate population of 530,500) was 21,453,000,000 U. S. gallons, while the quantity of sand, etc., removed from the grit chambers and sewers of these two districts was 103,452 cubic feet, thus giving a rate of 4.8 cubic feet of grit per million U. S. gallons. At Wiesbaden the same rate in 1902 was 10.1 cubic feet.

We come now to the more interesting question as to the quantity of matter that can be removed from sewage by screening. This has usually been regarded as insignificant, owing to the coarseness of the gratings that are commonly used. Thus at Providence, R. I., only about 800 pounds of screenings per day were collected in 1906 from an average daily flow of 19,500,000 gallons of sewage through stationary gratings of bars spaced about 1 inch apart, which is at the rate of 41 pounds per million gallons. The average quantity of suspended matter in this sewage is not reported, but if it is 2,206 pounds per million gallons, as in Worcester, Mass., of which 64.4 per cent. is combustible, or volatile, and, hence, of organic character, the screenings will be only about 2 per cent. of the total quantity carried in suspension. At the Dorchester sewage pumping station in Boston the screenings were said to have been 300 pounds per million gallons on the average in 1897, but the spacing of the bars is not given.

At the Manchester, England, sewage works three sets of screens are installed, the first having bars spaced 6 inches apart, the second 1¼ inches, and the third ½ inch. The first set arrests only the most bulky floating matter, and is cleared by hand. The second and third sets are cleaned mechanically by tines attached to bars of channel-iron, which are fixed to endless chains working on sprocket-wheels on each side. Above the top of each grating a pair of these sprocket-wheels is

driven by steam power, and as the channel-iron troughs overturn the contents drop into a belt conveyor, which delivers the wet material into tram-cars. The quantity of matter thus collected is not reported separately, but is included in the yield of the detritus pits.

In some experiments at Leeds in 1898, about 14 gallons of screenings were obtained by passing 52,000 gallons of day-time sewage into a horizontal trough 40 feet long, 3 feet wide and 1 foot deep, the bottom of which was formed by zinc plates perforated with ⅛-inch holes. The material consisted mostly of paper, vegetable matter and wool fibre, but unfortunately its weight is not given. From other data, however, the weight of such matter may be assumed at 4 pounds per U. S. gallon with 38 per cent. moisture, in which event the screenings would have yielded 183 pounds of dry organic matter per million U. S. gallons. This is a very considerable proportion of the total quantity of suspended matter, much of which is mineral.

During 1902 the sewage of Wiesbaden was passed through 3 sets of screens, the first having bars spaced 0.6 inch apart, while the second was formed of perforated plates with openings 1/5 to ⅛ inch wide, and the third of similar plates with holes only 1/25 inch in diameter. The average quantity of wet screenings collected was at the rate of 36.9 cubic feet per million U. S. gallons, but the weight is not given. If such weight is taken at 30 pounds per cubic foot, with 83 per cent. moisture, the said screens would have removed 1,107 pounds of wet or 188 pounds of dry (principally organic) suspended matter per million gallons of sewage. In another publication (Weyl, Hndb. d Hyg., Vol. 2, p. 151), this sewage is said to contain 618 pounds dry substance in suspension per million U. S. gallons, of which 284 pounds or 46 per cent. is organic. According to these figures, the screens intercepted about 66 per cent. of the suspended organic matter. Much difficulty, however, was found in keeping the fine screens clear, and subsequently the plant was modified by the introduction of a coarse rack or grating with bars spaced 1.6 inches apart, and the enlargement of the holes in the lowermost screen to 1/20 inch and 1/14 inch diameter. With the new arrangement the operation is greatly facilitated, and the quantity of suspended matter intercepted is increased about 15 per cent.

In 1901 Dr. Monti made a series of interesting screening experiments with the sewage of two populous districts of Berlin (Radial Systems V and VII), using the liquid that had passed through the detritus tanks and screens at the sewage pumping stations. These screens are formed of bars spaced 0.6 inch apart, and are installed at every pumping station in the city. The municipal reports for 1900 state that the aggregate quantity of matter thus caught during the year at all of the stations was 227,680 cubic feet, whence the daily average is 624 cubic feet, and that the aggregate average daily pumpage was 58,749,400 U. S. gallons; also that the wet screenings weigh 20 pounds per cubic foot, and contain 56 per cent. moisture, thus yielding 8.8 pounds of dry substance, mostly organic. According to these data, the said screenings would represent on the average 10.62 cubic feet of wet and 93.5 pounds

of dry organic matter per million gallons of sewage and storm water pumped.

Monti did not make any such determinations while conducting his own experiments, but dealt only with the screened and partly settled sewage as stated. After mixing together samples taken at different depths in the pump well, he caused the liquid to pass through a series of 5 wire-cloth sieves having meshes respectively 7, 4, 2, 1 and 0.5 m.m. (0.276, 0.157, 0.079, 0.39 and 0.0197 inch) wide, and also determined the total suspended matter by filtration. We found that on the average his series of sieves extracted only 13.3 per cent. of the total dry suspended matter at the first station, and 14.0 per cent. at the second, the totals being respectively at the rate of 6,098 pounds and 2,089 pounds per milion U. S. gallons, while the extracted dry (mostly organic) substance was at the rate of 810.4 pounds and 292.4 pounds. He concludes that although this fine screening removes all of the offensive-looking matter, yet the liquid remains quite turbid, and that much better results can be obtained by a few hours' sedimentation in large tanks.

Much seems to depend, however, on the composition and manipulation of the sewage, as the experiments made at Marburg in 1897, with three sets of large screens formed of thin bars respectively 0.60, 0.25 and 0.06 inch apart, indicated that about 40 per cent. of the suspended matter in the sewage was removed in the outset; but later observations after the sewers had been more extensively used by the public (pop. 20,000), showed a considerably smaller percentage of removal by the screens.

In 1905 experiments were made by Metzger in screening the sewage of a German city having a population of 50,000. The screen used was a large box with a bottom of wire-cloth having meshes 0.06 to 0.08 inch wide, and from a flow of 1,622,303 U. S. gallons of sewage in 24 hours, he obtained 8,119 pounds of wet material, thus making an average rate of 5,006 pounds per million gallons. The largest quantity was obtained from 8 to 9 A. M. when 1,333 pounds was collected from 94,000 gallons, and the least was 8.6 pounds per hour from 2 to 4 A. M. when the flow per hour was 41,200 gallons. These figures indicate very clearly the great difference in the efficiency of the screen at different hours of the day, and the erroneous conception of its efficiency gained by considering average percentages of removal.

It was also found that much more material could be collected when the screen was moved so as to continually expose a clean surface of wire cloth than when it was kept stationary. In the latter case a very large screen area was required to avoid an excessive loss of head. With a screen in the form of a wide endless belt of wire cloth passing at a steep angle through the entire rectangular cross-section of the sewer, and having an immersed area of one per cent. of that needed for a stationary screen, good results were attained with belt velocities of 0.5 inch to 2.0 inches per second, according to the hour of the day. These data do not suffice to answer various other questions connected with the problem, and it was intended to continue the experiments.

Endless belts of wire-cloth for screening sewage have lately been used in a number of small English cities, but data relating to their performance do not appear to be published. A device of this kind was installed at Göttingen, Germany, in 1905, the belt being woven with wires twisted into spirals, and forming meshes about 0.4 inch square when stretched between the revolving cylindrical drums. The population is about 30,000, and the dry-weather flow of sewage is in the vicinity of 2,200,000 U. S. gallons per day. At such times from 21.2 to 42.4 cubic feet, or from 485 to 970 pounds, of wet screenings are collected per day, while during rainy days the quantity is from 63.6 to 84.8 cubic feet, or from 1,455 to 1,940 pounds. The average in dry weather seems to be at the rate of 14.45 cubic feet, or 331 pounds per million U. S. gallons. The belt is driven by steam power at a speed of 8.15 feet per minute. It is claimed that 90 per cent. of the suspended matter is removed, but in view of the data previously cited, there is probably an error in this estimate.

In an interesting paper by Bredtschneider in Vierteljhsch f. Oefftl. Gesundhpf. Vol. 37 (1905) and Gesundhts Ingr. Vol. 28 (1905), the author states that it can be assumed from the available data that about 12.16 cubic feet, or 280 pounds, of wet suspended matter per million U. S. gallons, can be removed by screens from the crude sewage of large German cities; also that about 13.1 cubic feet of heavy grit, per million gallons, can readily be extracted by deposition in relatively small chambers, as previously described. He, as well as all other recent writers on the subject, insists that the screens and grit pits must be cleaned wholly by mechanical appliances, in order to make the labor at the sewage works as agreeable as possible. All parts of the plant should be kept scrupulously clean and free from unpleasant odors by the use of adequate means for ventilation.

The screens are cleaned in various ways. When they consist of a stationary grating, the surface is first cleared by a trough-shaped scraper with a stiff edge of india-rubber, like a squee-gee, and the interstices between the bars are then cleared by a series of tines projecting from a smaller trough, both of these appliances being attached to an endless chain moving uniformly on each side of the screen. Another method is to bend all the bars to conform to the segment of a circle, so that the grating presents a concave cylindrical surface, and in this case the scrapers are attached to radial arms projecting from a revolving shaft. A third method is to lift the screen periodically out from the sewage, in which event the appliances must be in duplicate, and then clean it by scraper, revolving brush and fine water jets. If wire-cloth is used, the cleaning is done by strong jets of either water or compressed air coming from the rear side. In all cases the wet matter is dropped into belt-conveyors which transport it to tram-cars for final disposal.

The object in these operations is to avoid breaking up the soft matter, either in the sewage channel or in the air above, and to avoid all spattering and loss of material. It must also be remembered that the scrapers, combs and brushes must likewise be kept clean. This leads to

the use of other tools or appliances, which are required to operate automatically in perfect accord with the primary ones. A little reflection on the problem suffices to establish its complexity, and hence it is not surprising to find such a variety of designs, the best of which still leave much room for improvement. Years ago attempts were made to accomplish the purpose by means of centrifugal extractors, but the principles were not understood well enough at that time. Latterly, however, the success achieved by such extractors in other industries has stimulated inventors to make new experiments, the first outcome of which has been a successful method of eliminating by centrifugal action a large proportion of the water from the thin sludge that accumulates on the bottom of settling tanks. This seems to be a great step in advance, and it is anticipated that the new process will soon take the place of the objectionable filter-presses which are now in use in many sewage purification works.

The third stage of treatment is sedimentation in large tanks or basins, whereby much of the suspended matter that has escaped through the screens is allowed to settle. The principles of this natural action, as well as the most advantageous size and form of basin, have been studied very closely during the past decade by a number of German engineers and chemists; and as the experiments were made with large quantities of crude sewage in tanks of the same dimensions as would be used in actual practice, the results thus attained constitute a most valuable addition to the empirical data that were formerly available from laboratory trials on a relatively small scale, and from various municipal plants not under constant scientific direction.

Sedimentation is required in cases where the quantity of clean and well-aerated water in the outfall is insufficient to dilute the screened sewage to such degree as may be necessary to prevent offense and serious damage to fish. It is also necessary as a preparatory treatment when the liquid must be more thoroughly purified by the oxidation of the dissolved organic matter. The process is accomplished by simply letting the sewage remain almost quiescent for several hours, but not long enough to develop septic fermentation and offensive emanations. In practice the liquid flows continuously at a very small velocity through a rectangular tank, whose cross-sectional area and length are such that a particle of liquid will be under way from three to six hours in passing from inlet to outlet.

The quantity of suspended matter that can be removed in this manner depends on its character and the efficiency of the antecedent grit chambers and screens. If thorough sedimentation is required, these two preliminary operations are usually limited to the extraction of only the heavier and coarser matters, thus leaving the settling tank to perform the principal duty and show a high efficiency. Under such conditions it was found that by letting the sewage remain in the tank about 12 hours a maximum of 90 per cent. of the total dried suspended matter was removed at Frankfurt, 83 per cent. at Cologne and 74 per cent. at Chemnitz. In Frankfurt the total quantity of dried suspended matter

during the experiments was very large, being at the rate of 10,861 pounds per million U. S. gallon, while in the two other cities it was only about 2,500 pounds per million gallons. For shorter periods of sedimentation the quantity of matter deposited was less, but not proportionally, as most of it was obtained within from 2 to 4 hours, according to circumstances.

From the careful observations made at Cologne and Hanover with tanks varying in length from 120 to 230 feet, it has been established that with a velocity of about 1/6 inch per second, or 0.8 foot per minute, a length of 130 to 150 feet, and, hence, a period of from 2¾ to 3¼ hours for passing through the tank, the largest quantity of sediment consistent with economical construction will be attained; and these figures are now generally adopted in Europe as standards for securing effluents by sedimentation which can safely be discharged into relatively large streams without further purification. In wet weather the velocity of flow is increased several fold, and reserve tanks are brought into use; and when it is obligatory to treat large quantities of storm-water the excess is temporarily stored in extensive shallow reservoirs having earthen bottoms, which are subsequently ploughed over to get rid of the deposit.

The sludge that accumulates in the masonry tanks is removed at least once each day to prevent the establishment of fermentation and disturbance by the escape of gas bubbles. Care is also taken to wash out each tank thoroughly with jets of water from powerful pumps, and in some places they are deodorized with a cheap oily by-product of the distillation of coal tar, called "facilol," which is applied as a spray. This substance is insoluble in water, and forms a very thin film on the surface of the sewage, whereby the latter is rendered repugnant to the flies and other insects that usually swarm about the works. The sludge contains about 90 per cent. of water, and is either pumped to areas of porous soil, which will gradually absorb the water and allow the solid matter to be ploughed in subsequently, or it is compacted by means of a filter press or centrifuge as previously mentioned. It is thus rendered capable of economical transportation to farms for composting with other manure, or to a crematory, where it can be burned along with other combustible municipal wastes.

In the foregoing it has been shown how relatively large quantities of organic matter carried in suspension in the sewage of cities which are located in the vicinity of large streams, are now being extracted inoffensively by mechanical methods at moderate costs. The dissolved matter, both organic and mineral, is allowed in these cases to discharge into the streams unchanged in any respect, and close observation of such water courses for several years has failed to establish the development of an unsightly pollution or serious injury to fish. There is no contention that the water of such a stream is fit for drinking soon after being mixed with the screened or sedimented sewage, but it is claimed that by the elimination of the coarser particles of putrescent and easily putrescible matter the natural processes of purification that are con-

stantly taking place in rivers will be competent to deal quickly with the dissolved matter, and also the remaining finely divided suspended matter.

Much yet remains to be learned with respect to the limits to which the pollution of a stream by screened or sedimented sewage can be carried without rendering the water offensive to smell and sight, as well as fatal to hardy fishes. In the latter direction some experiments have been made in small tanks, but the results do not agree with observations in natural streams, which indicate that several varieties of food fish can thrive in water containing considerable admixtures of dissolved organic matter. It is, therefore, hoped that this subject will receive proper attention from the authorities charged with the study and preservation of our finny tribes.

THE MODERN TREATMENT OF SEWAGE.

DISCUSSION OF PAPER BY E. KUICHLING, C.E.

BY CLYDE POTTS, C.E., MORRISTOWN, N. J.

Nearly ten years ago, when the speaker was just beginning a professional career, he had the good fortune to make the acquaintance of the gentleman who has just spoken. It is particularly fortunate for the young men of any profession to meet the older men, who have played an important part in establishing the principles and moulding the ethics of the profession to which he belongs. It is gratifying, then, for me to discuss the paper of the eminent gentlemen whose acquaintance exerted an early influence on my opinions.

Mr. Kuichling's paper embraces the results of many years of meditation and investigations. It is also more or less of a resumé of a recent trip through Germany. It is a fortunate and early message to America of the advance of the science in the old country.

Mr. Kuichling unconsciously draws the line between the treatment of sewage of metropolitan areas and ordinary towns and cities. It would seem that a limit can be drawn to differentiate between communities that offer no unusual problems and those whose sewage is practically impossible to purify. It may be possible to place this limit of population of communities whose sewage is easily treated as 50,000. Above this number difficulties increase until satisfactory treatment is impossible. There is a certain hopelessness about the treatment of the sewage of large populous areas, unless they be situated adjacent to large bodies of water, where ample dilution is to be had. From this paper we must gather the idea that the methods developed

for smaller places cannot be applied to larger cities or districts. For example, the sand filters of Saratoga, or the sprinkling filters of Columbus do not solve the problem of New York, Chicago, or even the Passaic valley. The sand filters at Saratoga seem to care for the sewage there as does the sprinklers at Columbus, but they are not necessarily applicable elsewhere where local conditions differ. There can be little doubt that the mechanical treatment as outlined by Mr. Kuichling is generally applicable. Screens will remove the gross suspended matter of any sewage, and settling tanks will remove the finer suspended matter. These would apply to the sewage of inland and seaboard towns, large or small.

Screening and settling, however, as Mr. Kuichling says, cannot be considered, except as a preparatory treatment. Much matter in solution, and practically all the pathogenic germs, escape in the effluent. As he says, this effluent must be subject to further treatment according to the demands of the local conditions. For the Passaic valley, Messrs. Hering and Fuller, in consultation with other eminent experts, have recommended that this effluent is a proper one to be emptied into New York bay. A screened effluent is being emptied into tide water at Boston. These localities are fortunate in being located on tide water. No other method seems possible on a practical scale.

The smaller cities and towns located inland must do more than this. They must further treat the effluent of these screens and tanks. Especially is this true of cities and towns draining into potable water. On the broad principles of sanitation, the emptying of the contents of the intestines of one human being into the drinking water of another is a crime. It is a crime because it is a form of water-poisoning. Several States, including New Jersey, have in effect so declared it, and have authorized their boards of health to abate it. The old common law of riparian rights, established before sanitation was a science, was the forerunner of these stringent sanitary laws. As sanitarians, we must subscribe to the doctrine that it is a crime against sanitation for the disease germs from the intestines of one human being to enter the drinking water of another. It is water-poisoning, because it produces disease and death.

As sanitary engineers, we must recognize the aforesaid doctrine when dealing with the sewage of the inland towns that drain into potable water. To apply this doctrine to the needs and ability to pay for inland localities becomes a problem. Screens will not solve it. Settling tanks will not solve it. Dilution will not solve it, nor will the theory of running water purifying itself solve it. Each may do its proper share, but much will still remain to be done. It is unfortunate that in the solution of so important a sanitary matter the question of dollars and cents should play so great a part. It seems to be more or less true that the death list from infectious and contagious diseases can be capitalized and used as an offset against the cost of installing proper works to protect lives.

Railroad companies and other corporations are frequently accused of capitalizing their damage claims and offsetting these against the cost of installing devices to avoid accidents, and it would seem that municipalities, unconsciously, perhaps, take the same view. Of course, the death and disease due to municipal neglect is a moral, and not a legal or financial matter. The responsibility rests with those in authority. In the present state of the art of sewage disposal it is claimed by different engineers that as many as ninety-five per cent. to ninety-nine per cent. of the bacteria in sewage can be removed. It would seem to be incumbent, therefore, on localities or individuals draining into potable water to attain this per cent. They should do this to conform to statute law and to sanitary law. The law I believe now takes cognizance of bacteria, which, of course, it did not do a few years ago. It recognizes the presence of bacteria in water, even though they be invisible to the eye of the laymen, jurymen or judges. This is a big step in advance.

The only known practical method by which ninety-five per cent. to ninety-nine per cent. of bacteria, together with a fair share of the putrescible organic matter in sewage, may be removed, is by sand filtration. Sand filtration may be preceded by any number of preparatory treatments, such as screening, settling and filtering in coarse filters. These preparatory steps reduce the size of the sand filters and prolong their period of use. It might be said that Messrs. Phelps & Winslow, of Boston, have made some interesting experiments recently, to show that sewage treated in a preparatory way may be sterilized with chloride of lime. If successful in practice, this may prove a substitute for sand filters.

In our own State of New Jersey, Messrs. Hering and Fuller have designed sand beds for Madison, which is on the Passaic water shed. Here sand beds are preceded by settling tanks and double contact beds. At Newton, on the Delaware water shed, a plant, consisting of sand beds preceded by settling tanks, was completed two years ago, and, according to the reports of the State Board of Health, is giving good results, and the cost of maintenance is low. Recent analyses show a bacterial reduction of more than ninety-nine per cent. Mr. Phelps has tried his chloride of lime process at Red Bank in an experimental way with good results.

Modern sewage disposal in New Jersey is an art or science in a state of development. The engineers look to the physicians to assist in creating a widespread sentiment for sewage disposal. In this matter we are all interested as sanitarians.

The further discussion of this paper by Civil Engineers G. E. Hill, M. R. Sherrerd and Rudolph Hering will be found on pages 15–18.

THE PREVENTION OF DUST ON HIGHWAYS.

BY JAMES OWEN, C.E., MONTCLAIR, N. J.

In a superficial consideration of the dust problem it may be questioned whether it is really a question of sanitation, but closer investigation and a more careful estimate of results show that health considerations are of grave importance, greater indeed than the accepted fact of discomfort and inconvenience.

With the advent of the automobile and its extensive use on the improved highways of the country, entirely new problems and conditions have arisen, the corollary of the problem being that the better the road the greater the travel, and both in this country and Europe the satisfactory solution of this problem is a matter of grave import, the solution being still in the future.

On the old-fashioned country roads in dry weather the dust was always a recognized fact, and it was tolerated because it was conceived that there was no method of prevention with reasonable economy. This dust was due to the grinding of wheels of carriages and the trampling of the horses' feet, was of fine texture as a rule, and no appreciable bad result, either to health or growing crops, was noted. With automobile travel, however, new conditions have arisen, due to the different action of the auto wheels on the road surfacing. The grinding process was substituted by a positive kicking and suction action of the tires, thereby disintegrating the road itself and scattering the particles far and near. This kicking action results also in a rapid disintegration of the road itself, so from an economic point of view, as well as from a sanitary standpoint, relief is imperatively demanded.

The new dust, as we may call it, instead of being an impalpable powder as before, consists of large or small particles of road material, which are raised in the air by the force of the machine and carried on to the adjoining lands or into the adjoining houses and gardens as the prevailing wind directs. This disposition on the adjacent property is one of the most potent causes of complaint.

The effects of this dust may be classified as bearing upon humanity, animals and farm products. Residents along a much travelled highway complain of the dust on their lawns, on the clothes hanging out to dry, and in their carpets. This occasions an enormous amount of extra work in household care, involving extra wear on all fabrics that are washed or swept, and in many cases has compelled householders to keep their windows and doors closed in hot weather, which is certainly not a sanitary recommendation. The net results of such trouble is materially more expense in household maintenance.

The disposition of dust on grass renders it undesirable for pasturage, affecting the physical condition of all grazing animals. The other serious effect of dust is its disposition on growing plants, fruits such as berries, and to a less extent on vegetables. In fact fruit lands adjacent to a road much traveled by autos have had to be abandoned and less exposed locations selected. Land used for such purposes has greatly lessened in value, and in many localities in this State a revulsion of sentiment in favor of good roads has become noticeable, and the strongest opposition to the new development in road construction is now being manifested on the part of the farming population not yet supplied.

It cannot be urged very strongly that the dust, *per se*, is positively harmful to man in a medical sense. The particles are as a rule purely mineral and inert in the system. The fœcal disposition from horses, not considered heretofore very harmful, is of course greatly decreased proportionally, and while it is claimed that dust may be a carrier of germs, there seems to be no possibility of these originating in a highway, so the question of their carriage need not be considered; however, the same deposition will occur after the dust itself has been eliminated.

Tests of the air in the streets of Paris and of those outside give the following results: In the city, 6 billions per cubic foot; country, 864 millions per cubic foot; at the same time the bacteria were respectively 20 per cubic foot in the city to 2 in the country. It may, therefore, be concluded that the dust of a highway is inert to the human system in a bacterial sense. The effects on the lungs and on the nasal tissues is, however, worthy of more consideration, the impalpable dust of the past being substituted by the hard, gritty, angular sections that now prevail. The writer has no data on this subject, and it is questionable whether they are very necessary, as the problem for discussion is the elimination of the dust. It is a nuisance under any consideration and circumstances, and with the present enlightenment on these subjects should not be tolerated. The writer in his experience in highway construction has felt for many years that the bane of the ordinary road surface was the prevalence of the dust, which is promptly turned to mud in wet weather. The mud, however, while not so harmful, has always been more a source of complaint than the dust, simply because its manifestations were more apparent to the eye, and more quickly affected the condition of the clothes of the wayfarer or the equipment of the driver.

The question has thus arisen, can this dust be eliminated, and how? Considering that the wear of a macadam road is the cause of the dust, eliminating the wear will cause the dust absolutely to cease. The dusty condition of a granite block pavement then confronts us. The wear on the stone is infinitesimal, yet in most cities all hard pavements are regularly sprinkled, the horse droppings and material falling from wagons and the attrition of the iron tires seeming enough to cause sufficient dust to necessitate its suppression. On asphalt pavements dust will arise, and on such a pavement there is practically no wear either on the surface or on the tires, therefore it must be accepted as an axiom

that the total elimination of dust cannot be expected, but it can be reduced to a minimum and such a minimum would be unobjectionable.

In appreciating the nuisance of dust the writer made estimates for sprinkling, but it was found that in moderately or sparsely settled communities the cost was prohibitive. The injection of clay relieved somewhat the wear of the stones but the dust was still a fact, and it was borne by the communities as one of life's burdens that could not be lifted, until the autos came along and the burden became intolerable, hence our condition of to-day.

The solving of the dust problem began to be investigated in arid countries, not on account of the dust but on account of the tendency of the road surface to break from lack of moisture, necessitating the injection of an extraneous material. The first experiments were made in Orran, Algeria, Africa, in 1898 by the French engineers, where the surface of the roads was sprinkled with a preparation known as oil of massat. This was found effective as far as preventing disintegration and dust, but required constant renewals. A little later the roads of California required treatment for the same cause, and they were sprinkled with the heavy crude oil of southern California containing a large proportion of asphalt. The result was a pronounced success and the process has been continued in that State. The French engineers then took up the matter with great thoroughness, experimenting with tar and mineral oils and with other preparations, and the practice of treating roads with some dust preventive has become universal. English engineers have been working along the same lines. The results so far have not been uniformly successful. A success would be recorded, then a failure, with apparently the same material in similar localities; so practically to-day the whole subject of dust prevention is in a somewhat tentative condition, but with the efforts made and the careful experiments now being undertaken, in the early future undoubtedly a crystallized practice will be arrived at, and the cost of constructing the road of the future with ideal conditions will be definitely known.

At the recent International Road Convention in Paris a great deal of discussion ensued, and much information was gathered, but it was the unanimous opinion of the delegates from America that while the roads generally in Europe were maintained in a better condition than the average roads of this country, the improved roads here were really better than there; and, further, no definite results as to construction or maintenance for dust elimination were arrived at in the meetings, the conclusion being that more experiments in that line were necessary, with the final deduction that the experimental results of this country in that line were further advanced than in Europe. It will, therefore, be sufficient to rapidly outline the American practice in improved highway construction and maintenance, as this will afford all necessary data for consideration.

The main point is that a hard road, so called, is not the desideratum, but that an elastic or resilient surface should be attained. Such a surface is obtained in asphalt pavements, smooth and resilient, with no

wear, and, incidentally, little dust. The cost of the so-called asphalt pavement is prohibitive in country roads, but the goal of all future efforts is to get something just as good at a much less price.

The elimination of dust may be classed under two heads, preventive and palliative. The prevention is to stop the creation of dust, the palliative to obviate the nuisance of its existence as far as possible.

The best method for the prevention of dust in a new highway is to so construct the surface that the wear will be at a minimum, and the same principle must be used in its maintenance by renewing the surface as for a new pavement. The three main ingredients for dust prevention are coal tar, asphalt and crude oil containing asphalt. In applying these materials in New Jersey the last, viz., crude oil, may be eliminated since the construction of a road with such material is only suitable for an arid climate.

The use of coal tar, both crude and refined, has so far given successful results in new work. The coal tar used is obtained from the gas works, and may, under certain conditions and with certain kinds of stone, be used with success. It is better, however, to eliminate the water contained by refining, as water is detrimental to proper bonding with stone. A preparation known as tarvia is in great demand at the present time and has given successful results.

After the foundation of a new road is laid the wearing course, consisting of stone about 1½ inches in diameter and three inches thick, is carefully spread and rolled. A coating of coarse screenings should then be rolled into the interstices until the surface is true and smooth. Then the heated tar is spread over the surface and carefully ironed in until it penetrates about two inches into the stone. This is allowed to set for about 12 hours without travel upon it, and upon this final dressing should be spread a light coating of screenings or sand, and rolled.

A very prevalent practice is to coat the tarred surface with a layer of screenings one inch thick. This is a mistake, as the screenings do not incorporate with the tar and are ground up, dust ensues, and it is then found necessary to sprinkle the surface to keep the dust from thus disintegrating the tar. In resurfacing a road the new stone similar to that above may be put on the old surface and treated in the same way. If, however, it is not desirable to add to the thickness of the road, the old surface should be broken up, the stone carefully screened, the dust being removed, and then replaced in its old position and treated in the same way as for the new stone. Generally a road treated as above will give good results, and its advantage over the old hard road method may be summed up as follows: Little wear on the surface and little dust.

The substitution of local stone for imported stock, heretofore considered necessary, as it has been found to be a fact that the softer stones, such as limestone, absorb the tar more easily and give an equally effective result with less money. The use of gravel in a gravelly country can be maintained, and if the gravel be screened it is as good as any broken stone.

The cost of such treatment is found by actual experience to be about 12 cents more than the ordinary hard road. Experiments have also been made with the use of pitch mixed with tar, the cost being about the same. A mixture of equal proportions of asphalt and tar manipulated in the same way as the tar itself gave excellent results as far as the road surface is concerned, but the cost was about 40 cents per square yard, which does not compare favorably with the tar. As to the relative wearing capacity the future alone can tell.

A new process is now in vogue which may bid fair to give the ideal road at a moderate cost. This road is constructed with the natural soil found on the site mixed with a certain proportion of asphalt. The roadway is ploughed up, harrowed and leveled, then the asphalt mixture is put on and thoroughly incorporated in the soil by means of a rolling tamper. The surface is finally rolled and coated with screenings. The cost is about the same, or a trifle more, than ordinary macadam.

This principle, if finally successful, will revolutionize our future road construction. With the use of stone or gravel its success is now undoubted, as specimens of such work have been constructed in Philadelphia. In the sandy and gravelly soil of this State its use will be a great boon. In the drift formation of the northern part its successful application will require further experience before full endorsement can be given. In the mountainous section probably tar may be cheaper to use with broken stone in first construction, but the final economical outcome as yet has not been determined. These processes constitute practically the present knowledge of road construction for the prevention of dust, and they so far have been more or less successful in accordance with the care and watchfulness of those in charge. It must be well remembered, however, that many partial failures have been due to the improper selection of the tar or asphalt, due to carelessness in manipulation, and also due to lack of knowledge on the subject.

Many attempts at dust prevention have been made as a sort of compromise between the preventive and palliative processes, as, for instance, putting a coating of dust and tar on an old macadam surface. This plan has been tried with varying success; in some places it stays in place, in others it has a tendency to peel off. If, however, a portion of such work remains good, it shows that it is possible to have it all perfect. To the writer's knowledge such work has been in existence for three years on a steep grade, and no repairs have been really necessary, while only a small percentage has peeled off.

Another practice is to coat the old surface with a mixture known as asphaltaline, on which is spread the dust. This is very successful in lightly traveled streets, but is not well adapted to heavily traveled highways, as the cost is great and renewals of necessity must be frequent. This process is really palliative only the periods of renewal are more remote.

In closing this allusion to dust prevention in construction, the writer is firmly convinced that the smallest amount of stone screenings placed on a tarred surface should be insisted upon. The French engineers

prohibit it entirely, only using sand or coarse rounded pebbles or gravel. It is claimed that the sharp edges of the crushed stone screenings break the surface of the tar, which is not desirable. However, it must be acknowledged that in the treatment of drives in public parks such practice is successful. Of course, there is no heavy teaming, the travel being mostly for pleasure automobiles. The cost of such treatment in the parks of Boston is about 6⅔ cents per square yard, and it was found that with a year's wear, after passing through a severe winter, one-half of the work done had to be retreated and the other half patched, and it is believed that this treatment will have to be made annually.

This experience, and that of the writer, shows that in the end such a process is not permanently desirable. The renewal of all surface once a year demands a constant force and a continuous process, and the interruption due to such process causes a great inconvenience to travel. It would seemingly be better therefore to make a thorough renewal of the top course, which will last a period of years, rather than incessant repairs, especially as the initial cost will be less.

It is now in order to consider what are known as palliatives or mediums to suppress the development of dust on an old surface, and to keep whatever dust is created from rising from the ground. Up to within a few years the only accepted practice was to use water from a sprinkling cart. Such a practice was costly and only available in such localities where the local residents were able and willing to pay for it. In the long stretches of country highways fronting on large farms, its use was prohibitive on account of the cost. The practice of watering a macadam surface was in the writer's mind of questionable availability (except that when the road was wet it settled the dust), and the use of water must be accompanied with good judgment, which is rarely the case. If too much water is used, or the water is applied with too much force, the durability of the pavement is greatly impaired. If too little, the dust still exists. The use of sodium chloride with the water is very effective, but in attempts at its use, the writer found an outcry arose that it was ruining the varnish of the wagons and was injurious to the horses' feet. The same accusation was made against calcium chloride, so practically all the sprinkling for years has been done with simple water.

The palliatives in use to-day, outside the use of tar as described above, are crude pertoleum from the eastern States, asphalt oil from California, and water gas tar, which can be handled in the same way as the oil. Various emulsions of the oils are also used with varying cost and varying success. The question arises in all the applications as to the cost of such application and the period of renewals, for it must be understood that all these palliatives are temporary in their character and require constant reapplication.

It was found in the Boston parks that an application of crude asphalt oil, at a cost of about six cents per square yard, lasted about a year; that a mixture of oil and water gas would last the season at a cost of three to three and one-half cents per square yard. The cost of oiling

the roads in Rhode Island, with crude petroleum, was about one cent per square yard, and required three treatments during the season. In an emulsion of tar and water, or oil and water, from a specially constructed mixing tank, sprayed upon the road, the water quickly evaporates and leaves the tar or oil in a film on the surface, which acts as a binder and dust layer, and has proved satisfactory in England.

In the Boston parks an emulsion was used, prepared as follows: To 50 gallons of water was added 18 pounds of cotten seed oil soap, heated to hasten solution; 100 gallons of crude petroleum is added to every 50 gallons of soap solution. The mixture is then agitated, and applied to the road well diluted. A cushion of oil is formed on the road, which holds the dust. The cost is from two to three cents per square yard. An emulsion is also prepared consisting of heavy Texas residuum, emulsified by the addition of ammonia, crude carbolic acid and creosote, well diluted before application. Two treatments are required a year. This mixture is only used on parkways and suburban roads, for the cost is too high for country roads.

Many preparations or emulsions have been used in England, France and Germany, and a number of patents have been taken out in this country for dust preventives. Many of them utilize waste products from factories, such as water lyes from wood pulp factories, the fat or grease from wool scourings, and the waste sulphate liquor in the manufacture of paper from wood pulp and also waste molasses.

These preparations are so far suggestive, having had no extended use, and but little data as to cost. It may be conceded, however, that with the inventive mind of the country astir on the definite proposition, and with the overwhelming demand for dust preventives, a solution of the problem will be early arrived at that will be satisfactory. The objection to all palliatives is that they are temporary in their character, require constant application, with great care in their application, and furthermore that they should be so effective that no dust ever arises that would have any palliative mixture combined, since then the dust objection would be increased four fold.

The use of petroleum application is objected to on account of its odor, which is very prevalent on application, the injurious effect of the oiled dust on wagons, autos and clothes, and also the aggravating conditions in wet weather when an emulsion is formed, which while not detrimental to the neighborhood, is ruinous to clothes and vehicles.

The dust bearing period of the highways ranges in this State from April to November, with intermittent rests from rains during that period. During winter it is rare that the dust problem arises, therefore, it is only a portion of the year, a little over one half of the whole time, that the dust affliction can exist. The problem then arises, is it cheaper to use the palliative for the six months' alleviation, or secure the more permanent construction requiring less attention and less care, and giving equally good results? The period of experience with us is only so far three years, almost too short a time for definite results, but, in the writer's mind, the preventive construction is the most desirable and should be followed out, especially when this vital fact is noted.

An asphalt or tar reconstruction properly made will undoubtedly reduce the cost of maintenance by the reduction of wear in the future, about one half, so there is finally a saving in the process. With the use of palliatives the wear still goes on, a little less in summer, but the same in winter. Any neglect in its continuous use would be calamitous.

Assuming that when prevention is the desired outcome, and that palliatives should only be used on particular demand, what should be done with the roads of New Jersey? The reputation of the New Jersey roads so far has been excellent. It was the pioneer State for road improvement in the country, and it is incumbent on the authorities, both local and State, to keep up this reputation to its former high standard. The use of automobiles with us, as with others, has practically rendered our old methods, both of construction and maintenance, which gave the original good results, inoperative, and a programme for future practice must be outlined under the new conditions.

We have say 2,000 miles of good roads in New Jersey, classified as main, subsidiary and local highways. In time with increasing travel the subsidiary may mean main and the local subsidiary. With such classification, good judgment would dictate a variation of treatment, and the following outline of action is suggested: All main roads in the future should be constructed with an elastic medium, either of asphalt or tar; all subsidiary roads, with congested population, should be treated in the same way in construction, and when permanent repairs are necessary, in the identical manner. Until such repairs are made, a palliative can be used. The subsidiary roads could be classified according to volume of travel, and built at first in the ordinary way. If, as is usual on a newly improved highway, the volume of travel abnormally increases, the permanent practice should finally be adopted. With the purely local country roads the usual construction can be followed.

The question then arises, will this cost more money? Initially, perhaps, yes; finally, positively, no. The accepted increase of price of 12 cents for tar macadam will undoubtedly make the first cost more in some localities, but in others less; the very fact that the character of the stone used (heretofore a matter of grave consideration) has become a secondary feature in the new work, will greatly reduce the price in localities where inferior stone is abundant, and also in sandy and gravelly regions; if, as the writer thinks probable, the mixture of asphalt and natural soil should become a steady practice, a practically permanent construction would be achieved; in any case the repair item would be greatly reduced in amount, so that whatever extra cost may be entailed on first construction would be wiped out in the first two or three years, and a constant saving would ensue for all the future.

It is important that a proper knowledge of these facts should be spread before the people of this State. An early adoption of the new methods of road construction and maintenance would contribute greatly to the health and comfort of our people, and prove an absolute saving of money in the end.

REPORT OF THE COMMITTEE ON ORGANIZATION OF ANTI-TUBERCULOSIS SOCIETIES.

MR. PRESIDENT AND GENTLEMEN—Your committee would respectfully present the following as their report:

When this committee was appointed, in December, 1905, very little progress in anti-tuberculosis work had been made in New Jersey. The Orange Committee and the State Sanatorium Commission, with Dr. Kipp at its head, were the only active organizations at work. As already reported, your committee took an active part in the organization of the New Jersey Association for the Prevention and Relief of Tuberculosis, and through the agency of that association there are at present twenty-one local committees.

In addition to these agencies for the control of this disease, we have in New Jersey the State Sanatorium at Glen Gardner, three special hospitals, at Orange, Secaucus and Verona; three dispensaries, at Camden, Newark and Orange; a day camp at Newark and a tuberculosis class at Montclair.

The State society also has a tuberculosis exhibit which has been exhibited in many places.

The interest varies in different parts of the State, but a remarkable work has been accomplished.

The following memoranda are offered as suggestions for the further development of anti-tuberculosis work in New Jersey: The State Sanatorium should be enlarged and provision made for patients willing to pay more than five dollars a week; at least two hundred beds should be provided at the present rate.

Every populous county should make provision for moderately-advanced cases. These should be treated either in a large camp with tents, or a bungalow with broad porches, associated with a group of tents. There should also be a closed hospital for advanced cases, with generous roof and piazza space for out-door living. The less populous counties should have the privilege of using their neighbor's facilities.

Each city should have a tuberculosis dispensary, with visiting nurses. The churches should be used as instrumentalities for the instruction of the people and their more careless neighbors in the hygiene of the anti-tuberculosis work.

The trades unions, the fraternal orders, the mutual and industrial insurance associations should be stimulated, not only to take part in spreading correct knowledge and training in the prevention of the disease, but also be urged to establish charitable institutions for the care and training of their members.

The people at large must be instructed in the details of prevention. So far as our present knowledge goes, the sputum is the source from

which we are to ward off the spread of the infection. The sputum is thrown off as spray in the act of coughing, or deposited in chunks. Everywhere from these sources the bacilli are carried either by the wind or by flies, to be inhaled or deposited on our food. The act of spitting must be guarded, and the product must be destroyed.

This education of the people is the function of the various anti-tuberculosis associations, and your committee presents herewith the second annual report of the State Association, and would respectfully suggest that our work as a committee is completed, and respectfully request to be discharged.

Respectfully submitted,

THOS. W. HARVEY,
IRWIN H. HANCE,
DAVID C. ENGLISH,
Committee.

REPORT OF THE PUBLICATION COMMITTEE.

To the New Jersey Sanitary Association:

The Publication Committee reports that the proceedings of last year's annual meeting were published in the same form as in previous years, and were distributed by the secretary. The volume, however, contained only sixty-one pages, because we had practically only one session for the presentation of papers, owing to the fact that our annual meeting was held in conjunction with the annual meeting of the American Public Health Association, and consequently there were but few papers read.

Your committee had the papers printed in the same type as the minutes—ten point, instead of the usual eight point type—at very little additional expense. This year the committee has had estimates from three printers, and find that the firm that has served us so well in the past is the lowest, the price practically that of last year, although the prices of labor and paper have advanced. We recommend that 500 copies be printed this year, instead of the usual 300, because the expense of the larger edition is very little more, and our proceedings are worthy of a much wider distribution. We suggest that if the authors of papers have them typewritten, and make subsequent corrections or additions *very legibly written* on the margin or by interlining, they will thereby greatly assist your committee in their endeavor to secure early issue of the proceedings.

Author's desiring reprints of their papers are requested to notify the chairman within ten days after the adjournment of the annual meeting.

Respectfully submitted,

D. C. ENGLISH, *Chairman,*
JAMES A. EXTON.

TREASURER'S REPORT.

George P. Olcott,

Treasurer, in account with the New Jersey Sanitary Association.

RECEIPTS.

1907.				
Oct. 1.	Balance cash on hand,			$214 02
1908.				
Dec. 1.	Dues received to date,			310 00
				$524 02

DISBURSEMENTS.

1907.				
Oct. 2.	Expenses of Annual Meeting—			
	C. J. Merrill, stenographer,	$24 00		
	Incidental expenses,	13 25		
			$37 25	
	Paid J. A. Exton, M.D., Secretary, expenses,		51 55	
	" Edward Guion, M.D., Membership Com- Committee expenses,		27 61	
	" Appropriation American Public Health Association,		150 00	
	" Whitehead & Hoag, for badges,		13 50	
	" D. C. English, M.D., Publication Committee expenses,		12 50	
	" MacCrellish & Quigley, printing Annual Report,		96 50	
	" Treasurer, postage, printing, etc.,		16 30	
				405 21
	Balance cash on hand,			$118 81

Respectfully submitted,

GEORGE P. OLCOTT,

Treasurer.

Examined and found correct,

Edward Guion,

D. C. English,

Auditing Committee.

Members of the New Jersey Sanitary Association.

REVISED JANUARY 1, 1909.

Allenhurst—J. M. Ralston.

Arlington—James A. Exton, M.D., William J. Fink, D.V.S., John W. Griffin.

Asbury Park—T. Frank Appleby, D. C. Bowen, Bruce S. Keator, M.D., Randolph H. Miller, Jesse Minot, Henry Mitchell, M.D., B. H. Obert, Randolph Ross.

Atlantic City—John M. Bensel, Paul F. DeDan, W. B. Dill, Rev. H. M. Gesner, Edward Guion, M.D., E. S. Johnson, President Board of Health, A. M. Jordan, C.E., Martin E. Keffer, J. W. Price, C.E., E. G. Schwinghamer, W. Frank Sooy, C. S. Thompson, W. Voorhees.

Bellville—Henry E. Ricketts, M.D.

Bernardsville—Josiah Meigh, M.D., L. E. Tuttle, M.D.

Beverly—G. T. Tracy.

Bivalve—John Gaskill.

Bloomfield—T. Howell Johnson, Joseph C. Sails, Ph.G. and V.S.

Boonton—John H. Capstick.

Bordentown—Rev. Samuel Henry Jobe, W. H. Shipps, M.D.

Boston, Mass.—L. B. Phelps, C.E.

Bound Brook—F. H. Bent, Arch., H. M. Herbert, C.E., Milton Knapp, Charles McNabb.

Bridgeton—J. Tomlinson, M.D.

Burlington—R. O. Clock, M.D., Shippen Wallace, Ph.D.

Camden—H. H. Davis, M.D., W. A. Davis, M.D., Edward L. Fair, Henry B. Francis, John O. George, D.V.S., W. I. Kelchner, M.D., John F. Leavitt, M.D., R. H. Reeves, Daniel Strock, M.D., H. G. Taylor, M.D.

Demarest—William E. Davies.

East Orange—Roger H. Butterworth, T. N. Gray, M.D., Harvey Mott, Geo. P. Olcott, C.E., W. H. Van Winkle, C. C. Vermeule, C.E., Hobart A. Walker.

Elizabeth—Judge E. S. Atwater, Louis L. Richards, Norton L. Wilson, M.D., F. A. Zucker, D.V.S.

Englewood—Wm. C. Tucker.

Finderne—Henry G. Opdycke, C.E.

Flemington—William H. Hawke, D.D.S.

Freehold—Alonzo Brower.

Gladstone—M. C. Smally.

Glen Gardner—Samuel B. English, M.D.

Grantwood—Guy Otis Brewster, Philip E. Brundage, M.D., George S. Drew, Jr., C.E., J. M. Young, Arch.

Hackensack—Fred. S. Hallett, M.D., Health Officer, Hon. William M. Johnson.

Hammonton—A. J. Rider.

Harrisburgh—F. Herbert Snow, C.E.

Hoboken—W. T. Kudlick, M.D., John J. Marnell, Esq., Thomas H. McCann, C.E., Henry B. Rue, M.D., E. T. Steadman, M.D.

Imlaystown—F. C. Price, M.D.

Jersey City—George T. Bonton, Gordon K. Dickinson, M.D., F. D. Gray, M.D., E. W. Harrison, C.E., F. E. Lambert, M.D., G. E. McLaughlin, M.D., J. C. Parsons, M.D., Ferdinand Sauer, M.D., W. C. Sherwood, Henry Smellie, Henry Spence, M.D., Charles A. Van Keuren, C.E., Hon. H. Otto Wittpen.

Kearny—Samuel Worthington.

Lakewood—V. M. Disbrow, M.D., I. H. Hance, M.O., Hon. William J. Harrison, W. G. Schauffler, M.D.

Leonia—R. J. G. Wood.

Metuchen—A. Clark Hunt, M.D.

Millburn—David E. English, M.D.

Millville—John W. Wade, M.D.

Montclair—M. N. Baker, C.E., John O. Brein, Jr., R. P. Francis, M.D., Edwin B. Goodell, Esq., Rudolph Hering, C.E., Jay E. Kilpatrick, Richard C. Newton, M.D., James Owen, C.E., Chester H. Wells, Health Officer.

Morristown—H. A. Heriques, M.D., John V. Laddey, D.V.S., D. H. McAlpin, M.D., Clifford Mills, Clyde Potts, C.E., J. E. Taylor.

Morris Plains—Britton D. Evans, M.D., Peter Sandford Mallen, M.D.

Mt. Holly—W. P. Melcher, R. H. Parsons, M.D.

Newark—Herbert B. Baldwin, Ph.D., David D. Chandler, W. T. Carpenter, R. H. Connelly, M.D., F. W. Corwin, M.D., Arthur R. Denmann, Laban Dennis, M.D., W. S. Disbrow, M.D., Hon. James L. Hayes, H. C. H. Herold, M.D., J. A. Lebkuecker, Nathan Myers, Arch., Addison B. Poland, Ph.D., Sumner Shailer, M.D., Otto B. Shalk, Morris R. Sherrerd, C.E., Harrison Van Duyne, C.E.

New Brunswick—David C. English, M.D., Wm. S. Myers, Ph.D., John B. Smith, E. R. Voorhees, Sc.D., H. Brewster Willis.

Newton—Whitfield Gray, D.V.S.

New York City, N. Y.—H. D. Dickerson, C.E., Geo. W. Fuller, C.E., Milton E. Horn, C.E., George A. Johnson, C.E., G. Everitt Hill, Alexander Potter, C.E., F. C. Poucher, Bleecker Van Wagenen.

Old Bridge—Asbury Fountain.

Orange—T. Earl Budd, D.V.S., Selskar M. Gunn, Thomas W. Harvey, M.D., D. V. Poor, M.D.

Passaic—A. Ward Van Riper, M.D., Robert M. Watson, C.E., Colin R. Wise, C.E.

Paterson—W. S. Ackerman, Robert H. Curts, M.D., James Fitzpatrick, R. Godeffroy, C.E., Henry Hewitt, M.E., John L. Leal, Wm. Herbert Lowe, D.V.S., William H. Macdonald, B. C. Maginnis, M.D.,

Elias J. Marsh, Jr., M.D., William K. Newton, M.D., J. Waldo Smith, C.E., Franklin Van Winkle, C.E.

Philadelphia—Charles M. Auerbach, John C. S. Davis, Albert E. Rousell, M.D.

Plainfield—T. S. Davis, M.D., Arthur Hall Dundon, M.D., C. H. Dunham, Fred. W. Dunn, Hon. Charles J. Fiske, Andrew J. Gavett, C.E., B. V. D. Hedges, M.D., Norman H. Probasco, M.D., L. R. Thurlow, Geo. J. Tobin.

Princeton—V. W. Bayles, C. F. Brackett, M.D., William Libbey, E. H. Loomis, Ph.D., Gen. A. A. Woodhull, M.D.

Rahway—Fred W. Sell, M.D.

Red Bank—Edwin Field, M.D.

Riverside—Alexander Small, M.D.

Riverton—Alex. Marcy, Jr., M.D.

Roosevelt—Edwin J. Heil.

Rutherford—S. E. Armstrong, M.D., David Bosman, F. F. Wood.

Salem—Henry Chavanne, M.D., William H. Chew.

Short Hills—Stewart Hartshorn, Hon. William Fellows Morgan.

Somers' Point—William Thompson.

Somerville—E. R. Voorhees, D.V.S.

Spottswood—Bernard Macfadden.

Spring Lake—Hon. O. H. Brown.

South Orange—John B. Duncklee, C.E.

Summit—B. S. H. Baker, C.E., Augustus F. Libby, John E. Rowe, Jr., D.V.S.

Trenton—J. Brognard Betts, H. B. Boice, Charles P. Britton, M.D., Henry A. Cotton, M.D., Frank E. Daniels, R. B. FitzRandolph, A.C.F. R.M.S., Arthur G. Furler, James M. Green, Ph.D., Judge Wm. M. Lanning, Geo. W. McGuire, John C. Smock, Ph.D., David S. South.

Verona—Geo. B. Dale, M.D., H. D. McCormick, M.D.

Villa Park—John M. Braly.

Westfield—J. B. Harrison, M.D., R. R. Sinclair, M.D.

Williamstown—Luther M. Halsey, M.D.